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SERIES B: MEDICAL AND VETERINARY.

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ERRATA.

Page 6 line 31 for " *maculatus* "	read " *maculipennis* "
,, 13 ,, 17 ,, " *argyritarsis* "	,, " *pictipennis* "
,, 14 ,, 2 ,, " *Haemophysalis* "	,, " *Haemaphysalis* "
,, 50 lines 14, 16 for " *albipes*, Meig."	,, " *albiventris*, Meij."
,, 50 line 16 for " *R.A.E.*, B, 171 "	,, " *R.A.E.*, B, ix, 171 "
,, 68 ,, 19 ,, " iodine "	,, " iodoform "
,, 76 ,, 29 ,, " *fajardi* "	,, " *fajardoi* "
,, 83 ,, 45 ,, " *R.A.E.*, A, iv, 67 "	,, " *R.A.E.*, B, vi, 67 "
,, 93 ,, 31 ,, " Alessandri "	,, " Alessandrini."
,, 102 lines 17, 19 for " *Nuttalia* "	,, " *Nuttallia* "
,, 102 line 20 for " *Ornithodoros* "	,, " *Ornithodorus* "
,, 104 ,, 52 ,, " *terra-reginae* "	,, " *terrae-reginae* "
,, 111 ,, 41 ,, " *R.A.E.*, A, ix, 171"	,, " *R.A.E.*, B, ix, 171 "
,, 122 ,, 32 ,, " BISHOP (F. C.) "	,, " BISHOPP (F. C.) "
,, 130 ,, 30 ,, " *Macaccus* "	,, " *Macacus* "
,, 174 ,, 48 ,, " Sanbon's "	,, " Sambon's "
,, 174 ,, 49 ,, " Allessandri's "	,, " Alessandrini's "
,, 215 ,, 46 ,, " MARZINOWSKY (E. T.)."	,, " MARZINOWSKY (E. I.)."
,, 218 ,, 2 ,, " *Ixodes columbae* "	,, " *Argas* (*Ixodes*) *columbae* "

,, 218 ,, 10 should read " that *Piroplasma canis* is also transmitted by *D. venustus*."

,, 236 ,, 4 for "RODENWALT (E.)." read " RODENWALDT (E.)."

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REVIEW

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SERIES B.

VOL. X.] [1922.

JOHNSTON (T. H.) & TIEGS (O. W.). **On the Biology and Economic Significance of the Chalcid Parasites of Australian Sheep Maggot-flies.**—*Proc. R. Soc. Queensland, Brisbane,* xxxiii, no. 6, 17th August 1921, pp. 99–128, 36 figs. [Received 31st October 1921.]

Sheep-maggot flies are amongst the commonest and most widely distributed insects in Australia, but at present their parasites are comparatively few. A description in here given of each species that has been recorded. *Nasonia brevicornis*, Ashm., commonly occurs in Brisbane, and is attracted by exposed decaying meat. The authors compare their observations in Brisbane with the previous works on the life-history of this Chalcid. Other hosts include the pupae of *Sarcophaga* sp. *Spalangia muscidarum*, Richardson, was first recorded from Australia in 1920 as parasitising various flies. In February this Pteromalid attacked *Sarcophaga impatiens* in Brisbane, when the life-cycle varied between 23 and 30 days; only one adult developed from each pupa. *Dirhinus sarcophagae*, Froggatt, was first bred in 1919 from pupae of *Sarcophaga aurifrons*, Macq. In Brisbane it is most common in February. It parasitises any common sheep flies. The pupal period is known to occupy more than seven days. The total life-cycle in November 1920 was 25 days and in January 1921, 28 days. Froggatt believes that this Chalcid searches below the soil for the pupae of *Sarcophaga*, but this has not been proved by further experiments. *Pachycrepoideus dubius*, Ashm., was first described from the United States, where it is a parasite of the house-fly; it has also been recorded from North Queensland [*R.A.E.*, B, ix, 156]. *Hemilexomyia abrupta*, Dodd, has been bred from *Ophyra nigra*, *Pollenia* (*Neopollenia*) *stygia* and *Musca domestica*, but it has not been recorded in Brisbane. *Chalcis calliphorae*, Froggatt, has already been noticed [*R.A.E.*, B, iv, 179; v, 166; ix, 169]. *C. dipterophaga* is closely allied to *C. calliphorae*, and was once found on blow-flies in Brisbane. *Australencyrtus giraulti*, gen. et sp. n., was first found in Brisbane in 1920. The female attacks the larvae of all common sheep blow-flies, including *Chrysomyia dux*, *Paracalliphora augur*, *Lucilia* sp., *Chrysomyia* (*Pycnosoma*) *rufifacies*, *C. varipes* and *Sarcophaga* sp. Experimentally several females attack a single pupa, and seven eggs are usually laid at a time; adults varying in numbers from 10 to 29 have emerged from one pupa. The life-cycle in midsummer lasts

20 days, in October about 25, and in May, 30. It is inferred that fertilisation may take place before the adults emerge from the host. The points of difference between *Australencyrtus* and the closely related *Echthrogonatopus* are given. *Paraspilomicrus froggatti*, gen. et sp. n., was first obtained from pupae of *Lucilia* in 1920, eight adults being bred from a single pupa. Fertilisation takes place after the adults emerge.

The economic importance of these parasites is discussed. *Dirhinus sarcophagae, Hemilexomyia abrupta, Pachycrepoideus dubius, Paraspilomicrus froggatti* and *Spalangia muscidarum* are too scarce to be of economic importance. *Nasonia brevicornis* has been considered the chief factor in blow-fly control, but its value depends on the ratio of the number of pupae to which it has access. In the experiments here described, undertaken partly in the laboratory and partly under natural local conditions, but not under sheep-district conditions, the percentage of pupae above the surface of the ground was found to be considerably less than those in the soil, and the Chalcid did not dig into the ground to reach the latter. The results obtained in April proved that heavy rains were unfavourable to the parasite, as no pupation occurred on the surface. Another deficiency on the part of *Nasonia* is the alleged inactivity of the parasite when the flies are most active—mentioned in the report of the Blow-fly Committee, Institute of Science and Industry, December 1920 [*cf.* *R.A.E.*, B, ix, 156].

Chalcis spp., which are rare, *Australencyrtus giraulti*, which is easily bred and is fairly common in Brisbane, and, in Britain, the Braconid, *Alysia manducator*, attack larvae. The latter lays a large number of eggs and only one in each maggot, and is worth introducing into Australia, provided that it is not known to parasitise useful insects.

A table of the parasites and their hosts in Australia is given.

MARTINI (E.). **Die Tasterfrage bei den Stechmücken.** [The Question of the Palpi of Mosquitos.]—*Arch. Schiffs- u. Trop.-Hyg., Leipzic*, xxv, no. 10, October 1921, pp. 295–301, 3 figs.

This paper discusses the structure of the palpi of mosquitos, with particular reference to the manner in which reduction in length has been brought about, first in the females and afterwards also in the males of various genera. The author supports the view that in this group of insects neither the length nor the number of joints of the palpi can be used for systematic purposes. He considers that the primitive palpus of the Nematocera was 5-jointed.

JABLONOWSKI (J.). **A bor-vagy eczetmuszlicza.** [The Wine or Vinegar Fly.]—*Természettudományi Közlöny, Budapest*, liii, no. 771–774, 15th October 1921, pp. 269–281, 6 figs.

The synonymy of *Drosophila melanogaster*, Mg. (*oenophila*, Lw.*), is discussed. This fly is very common and occurs everywhere, usually swarming in fermenting substances.

The egg and larval stages are described. In summer the life-cycle occupies 12 days, but in winter even in partly heated buildings it lasts 60–70 days or more. The larva does not feed on fermenting or decomposing matter itself, but upon the jelly-like layer that covers

[* This name is apparently a slip for *ampelophila*, Lw.—ED.]

such substances owing to the presence of a yeast or other micro-organism. It develops only in liquids when thick enough, or when covered by a film, such as that produced in vinegar-making by *Mycoderma.* The larvae feed on the organisms concerned in this process and are partly submerged in the fluid with the tracheae issuing from the film. The bionomics of these larvae are discussed at length. These facts explain the constant occurrence of this fly in the fermentation of dough when bread is being baked, as carried out in Hungary, as well as its presence in wine cellars that are not kept properly clean.

The author explains the phenomenon called by the French " vin cochylisé," *i.e.*, the occurrence of diarrhoea among the workers in vineyards during or before the vintage. This used to be erroneously attributed to excessive eating of the grapes, or more recently to the fact that they are dusted with copper sulphate and lime. The fact is that *D. melanogaster* is the actual carrier of this infection, and conveys the various organisms concerned from human excreta to the ripening grapes, while from infected bunches of grapes to others they are carried by the larvae of the two vine-moths, *Clysia* [*ambiguella*] and *Polychrosis* [*botrana*], which attack the vine in Hungary.

JABLONOWSKI (J.) & KADOCSA (G.). **A patkányveszedelem s az ellene való védekezés.** [The Rat Danger and how to control it.]—*Budapest,* " Patria " Pubg. Co., 1921, 80 pp., 7 figs., price Kr. 40.

Emphasis is laid on the dangers due to the abundance of rats that arose during and after the war. The damage done by rats, and their relation to disease, as well as their parasites, are reviewed.

In attempts to deal with them, various methods, including the construction of rat-proof buildings and the use of traps and poisons, especially the bulbs of *Scilla,* are recommended. The need for, and importance of, an organised campaign against them, especially in towns, is emphasised.

LEGENDRE (J.). **Anophelisme et Cuniculiculture.**—*C. R. Hebdom. Acad. Sci., Paris,* clxxiii, no. 15, 10th October 1921, pp. 600–602.

Further observations on the preference shown by *Anopheles maculipennis* for the blood of rabbits have confirmed the results already noticed [*R. A. E.*, B, viii, 98]. The keeping of rabbits is therefore advocated as a means of protecting man from this mosquito.

CONNOR (M. E.). **Fish as Mosquito Destroyers. An Account of the Part they played in the Control of Yellow Fever at Guayaquil, Ecuador.**—*Nat. Hist., New York,* xxi, no. 3, May–June 1921, pp. 279–281.

During the yellow fever campaign in Ecuador, various fish were experimented with as destroyers of mosquito larvae. Top minnows [*Gambusia*] were not found sufficiently hardy, and eventually, of several native fish tried, one known as the " chalaco " was selected as being the most useful in this connection. Arrangements were therefore made for its continued distribution to all water containers in Guayaquil. More than 30,000 water receptacles have been freed in this manner from mosquito larvae. With the further use of the fish, it is believed

that the yellow fever mosquito, *Aëdes argenteus*, Poiret (*Stegomyia fasciata*), may be reduced to such small numbers that the disease would not spread if introduced into a community.

Cox (F.), Jahraus (P.) & Moore (W.). **A List of California Arachnida. VI.**—*Jl. Ent. & Zool., Claremont, Calif.*, xiii, no. 3, September 1921, pp. 23–37, numerous figs.

This list of Californian Arachnida deals with the mites and ticks.

Chambers (F.). **Piroplasmosis of the Reindeer.**—*Vet. Jl., London*, lxxvii, no. 11, November 1921, pp. 415–419.

During the winter of 1918–19, cases of piroplasmosis were reported among reindeer in North Russia, the occurrence of the disease so far north being somewhat surprising. Kertzelli, in 1909, was the first to discover an organism that produced a fatal disease among reindeer. This he called *Piroplasma tarandi rangiferis*, and a translation of his work on the subject is given. The author was not able to observe actual cases, but examined many blood smears. In two, from different animals, a pure infection of an organism resembling *Anaplasma marginale* was observed. Some slides showed infection with a parasite closely resembling *Piroplasma mutans*, but the infections were never pure, a number of *Anaplasma* always being present. No organism resembling *Piroplasma* (*Babesia*) *bigeminum* was seen, though Kertzelli claims to have done so. No mention is made of the transmitting agent, nor of any experimental transmission. No ticks have been observed on reindeer in the district, but examinations were only made when the country was snow- and ice-bound. On the Kola Peninsula in June the author observed an enormous number and variety of biting flies (particularly Tabanids), though he saw no animal upon which they could subsist. All the flies caught were quite empty and apparently exceedingly hungry. It may be that Tabanids transmit the disease mechanically, but the author is inclined to believe that a tick is the transmitting agent.

Smith (A. H.). **A Remedy for Mange in White Rats.**—*Science, Lancaster, Pa.*, liv, N.S., no. 1399, 21st October 1921, p. 378.

Mange affecting white rats in laboratories, which is due to a species of *Notoedres* (itch or scab mite), may be successfully treated with a 2 per cent. solution of chloramine-T. The affected parts should be rubbed daily with cotton soaked in the solution, a cure generally being effected in less than a week.

Swamp Fever in Horses.—*North Dakota Agric. Expt. Sta., Agric. Coll.*, Bull. 146, March 1921, p. 45. [Received 3rd November 1921.]

During 1919–20, in the course of swamp fever investigations, attempts were made to determine whether inoculations of extract of *Gastrophilus* larvae into normal horses would give rise to secondary fever and symptoms of anaemia. A description is here given of the various ways in which this extract was tested on about 18 horses, the results being negative in every case.

van Loon (F. H.). **Pest en Pestbestrijiding.** [Plague and Methods for combating Plague.]—*Kolon. Inst., Amsterdam,* Meded. no. xii (Afdeel. Trop. Hyg., no. 7), 1919, vii + 137 pp., illustrated. Price 3 fl. [Received 2nd November 1921.]

This volume, intended for medical men in the Dutch East Indies, is divided into two parts, one being clinical while the other describes remedial and preventive measures, including fumigation and the rat-proofing of dwellings.

Bais (W. J.). **Over Verbreiding en Bestrijding van eenige Ziekten onder de Arbeiders in de Tropen.** [The Occurrence and Control of some Diseases among Labourers in the Tropics.]—*Kolon. Inst., Amsterdam,* Meded. no. xiii (Afdeel. Trop. Hyg., no. 8), 1920, 137 pp., 5 figs., numerous maps and diagrams. Price 2 fl. [Received 2nd November 1921.]

Various points in the epidemiology and control of tropical diseases are discussed in the light of experience gained from 1912 to 1919 on the East Coast of Sumatra at an altitude of 1,300–1,600 feet.

Malaria is endemic in the district, the Anophelines recorded being *Anopheles* (*Myzomyia*) *indefinitus*, *A.* (*M.*) *punctulatus*, *A.* (*M.*) *leucosphyrus*, *A. hyrcanus* (*Myzorhynchus sinensis*), and *A.* (*Cellia*) *kochi*. *A. leucosphyrus* was the only species captured in a house where several inmates had malignant tertian, and it is strongly suspected of being the cause of all the epidemics.

When, in July and August 1918, the rubber trees on an estate were irrigated, both benign and malignant tertian infections occurred in the hospital at the end of September. Though the drains were filled in within a 500-metre radius of the hospital, the number of Anophelines, chiefly *A. leucosphyrus*, did not markedly decrease, and it was afterwards found that this species can fly more than 800 metres from its breeding place. Of individuals of *A. leucosphyrus* taken in dwellings 1 per cent. were infected with malaria, while of those taken in the wards 4 per cent. were infected. Artificial infection experiments with *A. leucosphyrus* and benign tertian malaria yielded an index figure of 50 per cent. Though important, this is below that of *A. ludlowi* (which was not recorded in the district), as this species has an experimental infection index of 95–100 per cent. for malignant tertian and 80 per cent. for benign tertian.

A. leucosphyrus is a forest species, and the slow decline of malaria up to and including 1917 was caused by the destruction of its breeding-places as land was brought under cultivation. In 1918 there was an artificial increase of breeding-places on the rubber estates, as mentioned above, and this was supplemented by a prolonged rainy season. Conditions again became unfavourable to *A. leucosphyrus* in 1919 owing to prolonged drought and to drainage, but there still remain sufficient forest patches among the plantations to maintain it.

van Loghem (J. J.). **Vraagstukken der Indische Hygiene.** [Dutch East Indian Hygienic Questions.]—*Kolon. Inst., Amsterdam,* Meded. no. xiv (Afdeel. Trop. Hyg., no. 9), 1920, viii + 159 pp. Price 3 fl. [Received 2nd November 1921.]

In the section on malaria the great advance made in recent years in the Dutch East Indies is referred to. A careful study of local

mosquitos and the adoption of measures confined to those species that carry the disease are the chief lines along which progress has been made.

ROUBAL (J.). **Dva koleopterolog. Příspěvky z Příbamska.** [Two Coleopterological Contributions from the Neighbourhood of Pribam.]—*Časopis Československé společnosti Entomologické, Prague,* xviii, no. 1–2, 1921, pp. 26–29. [With a summary in French.]

In Bohemia, the beetles found in the hutches of domestic rabbits are nearly the same as those occurring in the burrows of wild ones. A list of these is given.

CARRANTE (V.). **La Lotta contro le Zecche e le Piroplasmosi degli Animali domestici.** [The Work done against Ticks and the Piroplasmoses of domestic Animals.]—*Il Picentino, Salerno,* x, nos. 4–5, 6, 7, 9–10, April–May, June, July, September–October 1921, pp. 46–48, 61–64, 99–101, 130–133.

This review contains no new information, but gives an outline of present day knowledge regarding ticks, the injury done by them and the measures adopted against them. It also deals with the transmission of disease by ticks and the prophylaxis of piroplasmosis.

OSTERWALD (H.) & TÄNZER (E.). **Ein Jahr Anophelenbeobachtung.** [A Year's Observations of Anophelines.]—*Centralbl. Bakt. Paras. Infekt., Jena,* Ite Abt. Orig., lxxxv, no. 1, 27th September 1920, pp. 42–46. [Received 5th November 1921.]

The authors agree with the view that in Germany Anophelines chiefly occur in cattle sheds. The district near Halle, where their previous work had been done [*R. A.E.*, B, ix, 68], was chosen for further investigations, a shed being visited on one afternoon each month from March 1919 to March 1920. At first a horse was the sole occupant, but in October it was replaced by rabbits, goats, pigs and domestic birds. In this particular shed *Anopheles maculatus* was the only species found. In some others a few specimens of *A. bifurcatus* also occurred, while in others again *A. bifurcatus* only was taken.

Anophelines like dry, warm sheds, with dark corners, where numerous cobwebs give facilities for settling, This may point to the value, already mentioned by the authors [*loc. cit.*], of hygienic conditions as a means for reducing the number of mosquitos in sheds. It is in summer, when Anophelines are most numerous, that they are least exacting in their choice of shelters, so that they may then be found in well-lit sheds, especially if the latter are near suitable breeding-places. Some Anophelines suck blood even in the winter, which is not the case with Culicines, which hibernate in cellars. This is probably due to the greater activity, and consequent need for food, of Anophelines in sheds as compared with *Culex* in cool cellars. Anophelines in sheds could not be got to bite when intentionally disturbed, but captive Anophelines readily sucked blood from a finger offered to them, even in winter. The desire to bite was most marked in December, and the early evening hours were those in which bites were most frequent. Males occurred with the females, but in smaller numbers and only in summer, from June to September. Even in warmed rooms the females

could not be induced to oviposit in winter, and it was not until March that oviposition began in captivity. In 1919 the first larvae were seen in May. At the chief observation post adults were seen throughout the year, but, on the other hand, not a single *Anopheles* was seen in sheds in the summer of 1919 in localities where in 1918 no pools containing Anopheline larvae could be found. The authors therefore agree with Nuttall that a knowledge of the distribution of the larvae makes conclusions as to the distribution of the adults possible without a special investigation. It is known that *A. maculipennis* hibernates as an adult and *A. bifurcatus* as a larva, and the authors never saw adults of the latter in winter. Though no definite information was obtained as to the length of life of adults, it is probable that hibernating females live for several months.

HASE (A.). **Zur Frage des "Lebendiggebärens" der Kleiderlaus.** [On the Question as to whether the Clothes Louse is viviparous.]—*Centralbl. Bakt. Paras. Infekt., Jena,* Ite Abt. Orig., lxxxv, no. 5, 17th January 1921, pp. 377–379. [Received 5th November 1921.]

A statement by R. Weigl that he had observed cases of lice [*Pediculus humanus*] being viviparous is criticised. There is no confirmation of this, though some lice have been known to deposit eggs that are about to hatch.

GALLI-VALERIO (B.). **Beobachtungen über Culiciden.** [Observations on Culicidae.]—*Centralbl. Bakt. Paras. Infekt., Jena,* Ite Abt. Orig., lxxxvi, no. 1, 15th March 1921, pp. 31–33. [Received 5th November 1921.]

These observations were made near Lausanne from October 1918 to October 1920.

The larvae of *Anopheles bifurcatus* were numerous in both winters, even beneath ice. Pupae of *Theobaldia annulata* were present from October to December, and were very numerous on 29th October 1920 at an air temperature of about 43° F. (6° C.) and a water temperature of about 45° F. (7° C.). The larvae of *Aëdes* (*Finlaya*) *geniculatus* (*Culicada ornata*) and *Anopheles plumbeus* (*nigripes*) were found hibernating in woods. Young larvae of *Culex pipiens* and *T. annulata* were found in October. The first emergence of *T. annulata* was noticed on 29th March 1919, that of *A. bifurcatus* on 13th May, and that of *Aëdes geniculatus* on 19th April. The first pupae of *A. bifurcatus* were found on 16th April 1919 and 4th June 1920. The pupae of *A. maculipennis* were especially common in September.

As regards breeding-places, when the municipal authorities filled in many puddles at Vidy, the mosquitos adapted themselves to waters in which they previously had been scarce. Some bred in water with scanty vegetation, and the larvae of *A. maculipennis* were found in very dirty water. Stagnant water containing reed and wood debris harboured few larvae, thus confirming Thibault's discovery of the larvicidal action of vegetable powders [*R. A.E.*, B, vi, 218]. *T. annulata* can develop in water so yellow with rust from the container that the larvae and pupae are stained with it.

Further details are given on the distribution in Switzerland of *Aëdes geniculatus*, *A.* (*Ochlerotatus*) *communis* (*Culex nemorosus*), *Culex hortensis* and *A.* (*O.*) *pullatus* var. *jugorum* (*gallii*).

In connection with anti-mosquito measures attention is drawn to the importance of rain-water barrels as breeding-places of *Culex pipiens*, and of old pots and tins in the case of this species, *A. bifurcatus* and *A. maculipennis*. Observation has confirmed the value of the author's suggestion that a few collections of stagnant water should be left as traps in which large numbers of larvae and pupae may be destroyed.

Galli-Valerio (B.). **Le Cycle évolutif probable de l'***Herpetomonas pyrrhocoris*, **Zotta & Galli-Valerio.**—*Schweiz. med. Wochenschr.*, 1, 1920, pp. 401–402. (Abstract in *Centralbl. Bakt. Paras. Infekt., Jena*, IIte Abt., liv, no. 3–7, 12th July 1921, pp. 188–189.) [Received 5th November 1921.]

Herpetomonas pyrrhocoris is a flagellate found in the bug, *Pyrrhocoris apterus*, which usually occurs on *Colchicum autumnale*. In the spring the rotting blossoms become a brown, semi-fluid mass, which contains an abundant saprophytic fauna. In this decomposing matter the flagellate reaches the intestine of the bug, multiplies, and is deposited again in autumn on the blossom (without a flagellum) with the insect's excreta. In this medium the organism survives the winter. The author considers these conditions to be an even more primitive degree of the adaptation of a saprophytic protozoon to an internal parasitic life than obtains in *H. davidi*, which lives in the latex of *Euphorbia*.

Tonnoir (A.). **Une nouvelle Espèce européenne du Genre** *Phlebotomus* (*Ph. neglectus*).—*Ann. Soc. Ent. Belg., Brussels*, lxi, no. 9–10, 3rd November 1921, pp. 333–335, 1 fig.

Phlebotomus neglectus, sp. n., is described from several examples in the Vienna Museum. This species resembles *P. perniciosus*, Newst., though in size it is nearer *P. papatasii*, Scop. Its geographical distribution is practically confined to the eastern Adriatic Coast, and it is rather remarkable that this is the region where three-day fever, of which *P. papatasii* is considered to be the vector, occurs with the greatest intensity. It is quite possible, therefore, that, contrary to the generally accepted theory, *P. neglectus* may be the chief carrier of the fever, which, moreover, does not occur in many regions where *P. papatasii* is found.

Kolbe (W.). **Ist Schafzucht in den Tropen möglich?** [Is Sheep-breeding possible in the Tropics?]—*Beiheft zum Tropenpflanzer, Berlin*, xxi, no. 1, September–October 1921, 31 pp., 2 figs.

Practical information on dips and dipping of sheep is given at some length in this paper.

Wenyon (C. M.), Anderson (A. G.), McLay (K.), Hele (T. S.) & Waterston (J.). **Malaria in Macedonia, 1915-1919.**—*Jl. R. A.M.C., London*, xxxvii, no. 2, August 1921, pp. 81–82.

In view of the serious handicap to military operations in Macedonia caused by the epidemic of malaria, a malaria inquiry laboratory was

instituted, the investigations of which covered a wide field. The results have been collected and will appear in a series of five papers.

WENYON (C. M.). **The Incidence and Aetiology of Malaria in Macedonia.**—*Jl. R.A.M.C., London,* xxxvii, nos, 2, 3, 4 & 5, August, September, October & November 1921, pp. 83–108, 172–192, 264–277 & 352–365, 20 figs., 5 plates.

An account is given of the malaria epidemic in the Salonika army in Macedonia, and the topography of the country and the remedial measures undertaken are described. Every spot along the line was heavily infested with mosquitos, *Anopheles maculipennis* being the prevalent species in the valleys, while *A. superpictus* proved to be essentially a hill stream species and was found all over the high land. During 1916 over 4,000 cases of malaria occurred on the lines of communication, and in all over 30,000 cases were recorded for the year. The native inhabitants undoubtedly constituted the foci of infection in the first place, and a very high percentage of the troops still harboured parasites in their blood during the winter. Infection with *Plasmodium vivax* may persist throughout the winter, but *P. praecox* (*falciparum*) tends to disappear spontaneously or as a result of quinine.

The measures undertaken included drainage of swamps, clearing of streams, destruction of larvae and adults, and the use of mosquito nets, repellents, prophylactic quinine, etc. As many of the troops as possible were camped on the high land. The complete extermination of mosquitos from the vast area involved was impossible under war conditions ; under peace conditions the drainage would require the expenditure of millions of pounds, and even then it is doubtful if anything very satisfactory could be accomplished in less than five or more years of continuous work. During the war much of the drainage and clearing work could only be carried on at night, and there was enough untouched breeding ground beyond the line to infect the whole army. The men could only be satisfactorily protected by the contrivances used to prevent their being bitten by mosquitos. Except in certain localities anti-mosquito work could only be done in patches, and in most cases the effect was lost owing to the surrounding untreated areas. For the year 1917 over 70,000 cases of malaria were recorded. This large figure may be partly explained by the unrestricted submarine warfare having prevented the usual embarkation of severe cases. In 1918 a similar state of affairs occurred. A scheme was therefore devised whereby all troops in and out of hospital were inspected, and badly infected men were evacuated by the overland route via Taranto. This resulted in a great reduction of the numbers admitted into hospital. The malaria incidence in 1918 was, however, seriously affected by an outbreak of influenza, resulting in an inevitable confusion of diagnosis, as it was difficult to decide which was the primary disease. Of over 100 autopsies performed on cases diagnosed as influenzal pneumonia, 83 per cent. showed previous malarial infection, proving to what a large extent the army of Macedonia had become infected.

It is very difficult to estimate the relative effect of the various anti-malaria measures adopted when the number of mosquitos attacking an individual amounts to hundreds, if not thousands ; the reduction of a small portion of these will not lessen his chances of infection. It would thus appear that the clearing measures undertaken can have

done practically nothing to lessen the incidence of infection. With sufficient labour it would not be impossible to keep a certain area free from mosquitos, provided that the work extended far enough, as the mosquitos in Macedonia will travel a mile or more. But even in the districts that were less difficult to deal with, the mosquitos could not be eradicated, and it would have probably been better to concentrate energy on direct protective measures. Of these, quinine prophylaxis was tried, but although it may have protected a small number of individuals, it failed to prevent infection in thousands of cases, and it is questionable whether it is worth while on so vast a scale. The daily administration of quinine, however, undoubtedly prevented relapses in infected men. The third measure adopted was to protect the men from bites. For this purpose head nets and gloves, though of limited use, were distinctly advantageous in certain places. Repellents of various kinds were generally employed, but their effectiveness depended apparently more on the grease used than on the other ingredients, and they therefore required frequent application.

Consequently it is thought that better results might have been obtained had the money been spent on the erection of mosquito proof huts and hospital wards, the issuing of a constant supply of mosquito nets, etc., rather than on anti-mosquito measures and quinine prophylaxis.

The occurrence of malaria in 1919, after the armistice, in Salonika, Constantinople, ports on the Black Sea and the Caucasus is also reviewed. *A. maculipennis* and *A. superpictus* both occurred in the vicinity of Batoum, but it is thought that anti-mosquito work carried out in this district under peace conditions should give good results. Along the railway line from Tiflis to Baku, *A. maculipennis*, *A. hyrcanus* (*sinensis*) and *Aëdes* (*Ochlerotatus*) *caspius* (*dorsalis*) were taken. The Caucasus is a highly malarious country, and there are probably areas that are nearly, if not quite, as bad as some of the worst districts of Macedonia. The Anophelines of primary importance are *A. maculipennis* and *A. superpictus*. *A. bifurcatus* is probably of little account as a malaria carrier, for it is comparatively rare, as is also *A. algeriensis*.

In Macedonia the females of *A. maculipennis* and *A. superpictus* hibernate in any sheltered spot. From April onwards the adults become numerous, and breed rapidly in the streams and marshes until November. Even in Macedonia, where the winter is very severe, hibernation as applied to Anophelines is a relative term. They may take a meal of blood during the winter in warm stables, but in colder ones they remain inactive.

Experiments indicate that as regards infectibility with *P. praecox* and *P. vivax*, *A. maculipennis* and *A. superpictus* are practically the same. The earliest date on which an infected *A. maculipennis* was found was 11th May in Macedonia. Individuals of *A. superpictus* taken during the winter months were found with oocysts on the stomach. Experiments here described show that under certain conditions the carriage of malaria through the winter by hibernating mosquitos is a possibility.

The clinical aspect of the disease, including an explanation of the late appearance of malignant tertian and the severity of Macedonian malaria, is briefly discussed.

The development of the malarial parasite in Macedonian Anophelines and the technique employed are described.

Ferris (G. F.). **Contributions toward a Monograph of the Sucking Lice. Part II.**—*Stanford Univ. Cal., Pubns., Biol. Sci.*, ii, no. 2, 1921, pp. 59–133, 56 figs.

In this part thirty-six species belonging to the genus *Hoplopleura* are dealt with, including twenty-one new species and two new subspecies [*cf. R.A.E.*, B, viii, 71].

Zetek (J.). **The Panama Canal Species of the Genus** *Anopheles.*—*Mount Hope, C.Z.*, Panama Canal Press, 1920, 28 pp., 6 plates. [Received 8th November 1921.]

The Anophelines dealt with are *Anopheles albimanus*, Wied., *A. tarsimaculatus*, Goeldi (which the author gives reasons for treating as a variety of *A. albimanus*), *A. argyritarsis*, R.D., *A. pseudopunctipennis*, Theo., *A. eiseni*, Coq. (*niveopalpis*, Ludl.), *A. punctimacula*, D. & K. (*malefactor*, D. & K.), *A. apicimacula*, D. & K., *A. neivai*, D. & K., and *A. hylephilus*, D. & K.

Keys to the adults and larvae are given. The bionomics of these species are to be considered in a future report. The methods employed for the collection, study and preservation of mosquitos are described.

Anderson (T. J.). **Insects affecting Stock.**—*Brit. E. Africa Dept. Agric. Ann. Rept. 1917–1918, Nairobi*, 1921, pp. 89–93. [Received 10th November 1921.]

A brief report is given on the distribution of tsetse-flies in the Southern Masai Reserve. *Glossina pallidipes*, Aust., was found, generally in the bush and fairly close to water, though four individuals were taken at least two miles from water. *G. longipennis*, Corti, was unexpectedly abundant on the moist, swampy flats and on the bank of a river; it is generally associated with drier areas and is said to avoid water.

Among fleas sent in, chiefly from dogs, were many examples of *Ctenocephalus felis* and a few of *C. canis*. A table is given of the species sent in by the medical officer at Mombasa. Contrary to expectation, of 144 fleas examined, only 33 were *Xenopsylla cheopis* (generally supposed to be the common flea in Mombasa), the remainder being *X. brasiliensis*, which is apparently recorded for the first time from East Africa.

Hadwen (S.). **Warble Flies,** *Hypoderma lineatum*, **Villers, and** *Hypoderma bovis*, **De Geer.**—*Canada Dept. Agric., Health of Animals Br., Ottawa*, Sci. Ser. no. 27, July 1919, 24 pp., 29 figs. [Received 9th November 1921.]

Observations on warble-flies were begun at Agassiz, British Columbia, in 1911. As the reports published from time to time in connection with this work are now out of print, the results have been summarised in the present paper. Most of this information has already been noticed [*R.A.E.*, B, iv, 195; vi, 45, etc.].

Herrick (G. W.). **Household Insects and their Control.**—*Cornell Univ. Coll. Agric., Ithaca, N.Y.*, Household Manag. Ser., Lesson 134, July 1920, 46 pp., 24 figs. [Received 11th November 1921.]

In this popular bulletin the author deals with the more important insects that may be found in houses, and their relations to the welfare

of the human inmates. Suggestions are given for the most practicable methods of preventing damage by these pests, with a list of the literature that may be consulted for further information concerning them.

Eradication of Sheep Scab.—*Vet. Record, London,* xxxiii, no. 1740, n.s., i, no. 46, 12th November 1921, pp. 905–907.

The information in this paper is taken from an address by W. J. Young.

Sheep scab is due to the presence in the skin of the mite, *Psoroptes communis ovis*. The known facts as to the life-history are quoted. The existing legislation in Great Britain is briefly noticed, as well as various necessary precautions in mixing and applying the dips recommended by the Ministry of Agriculture. Infection should be prevented by careful inspection of railway trucks in which sheep are to travel, and the dipping, twice within fourteen days, of all sheep brought from market. Sheep should be isolated during this period. Soft water should be used for dips, sea water and brackish or peaty waters being highly objectionable.

NOC (F.) & NOGUE (M.). **Ictères épidémiques et Spirochètes au Sénégal.** [Epidemic Jaundice and Spirochaetes in Senegal.]—*Bull. Soc. Path. Exot., Paris,* xiv, no. 8, 12th October 1921, pp. 460–470.

Details are given of three outbreaks of epidemic jaundice that occurred among the troops in camp in Senegal between 1916 and 1921. While studying the problem of whether the disease is indigenous, spirochaetes closely resembling those of relapsing fever and pathogenic to monkeys were found in the shrewmouse and in *Mus decumanus*. In the course of a somewhat hurried survey, *Ornithodorus* was not discovered; in fact ticks of this genus have not as yet been observed in French West Africa. The cases under discussion, however, harboured a number of lice, and in one of these parasites a spirochaete was found. Inoculation of a young *Cynocephalus* monkey by crushing lice on the freshly shaved skin gave, however, a negative result. It is still doubtful, therefore, whether the disease has been introduced from a foreign source by means of lice, by the troops coming in from Morocco or the southern colonies, or whether it arises from an indigenous organism resembling that of tick fever.

ROUBAUD (E.) & DESCAZEAUX (J.). **Contribution à l'Histoire de la Mouche domestique comme Agent vecteur des Habronémoses d'Equidés. Cycle évolutif et Parasitisme de l'***Habronema megastoma* (**Rudolphi 1819**) **chez la Mouche.**—*Bull. Soc. Path. Exot., Paris,* xiv, no. 8, 12th October 1921, 471–506, 1 plate, 9 figs.

In the authors' conclusions to this paper, the close analogy is explained between the development of *Habronema megastoma* in the house-fly [*Musca domestica*] and that of the filariae of the dog, *Dirofilaria immitis* and *D. repens*, in the mosquito.

In the horse, infestation with *H. megastoma* is produced by flies alighting on wounds (cutaneous habronemiasis), on the nostrils (pulmonary habronemiasis), or on the lips (habronemiasis of the stomach). Gastric infestation through the ingestion of parasitised flies, if it is possible, would seem to be merely accidental, and the whole process of development suggests a spontaneous liberation of the active larvae at the entrance to the digestive tract. Cutaneous or pulmonary lesions are caused by stray larvae, the development of which has no relation

to the parasites in the stomach. The heavy infestation of flies by *Habronema* produces a considerable degree of mortality among them ; this fact renders the parasites to a certain extent beneficial.

BACHMANN (A.). **Notes sur les Moeurs des Anophèles et leurs Conditions de Gîtes dans la Ville de Famailla (Tucuman, République Argentine).** —*Bull. Soc. Path. Exot., Paris,* xiv, no. 8, 12th October 1921, pp. 506–511, 3 plates.

The preliminary results are recorded of an investigation, under the Government of Tucuman, into the local Anopheline conditions in the town of Famailla, of some 2,500 inhabitants, which has been selected for a demonstration of anti-malarial work. *Anopheles pseudopunctipennis* was found abundantly in all the houses at all times of day and in all weathers, the average number being about 15 in each room. Both sexes were found, and it is evident that fertilisation can occur in houses, that the whole life-cycle can take place under domestic conditions, and that the fertilised female only leaves the vicinity of the house for oviposition. A small number of *A. argyritarsis* (*albitarsis*) was also present in the houses, but all were males ; this species, however, must undoubtedly be considered in anti-malarial work. On warm summer days *Culex* spp. are abundant around the houses ; as twilight deepens, however, they gradually disappear, but a few moments after the last have gone, *A. argyritarsis* enters from the shelters where it has been hidden during the day, the flight lasting for about a quarter of an hour.

The breeding-places of both species of *Anopheles* are evidently intimately connected with collections of algae ; they invariably occur together, and are particularly numerous in clear, slow-moving streams with sandy margins, without vegetation and well exposed to the sun. The many springs and small canals are particularly favoured, producing abundant collections of algae that serve both as protection and food for the larvae. Several typical breeding-places are described and illustrated. It is noticeable that wherever the streams are shaded by trees no larvae are found. The larvae hibernate in damp, muddy or sandy places covered with algae.

WENYON (C. M.). **The Action of "Bayer 205" on *Trypanosoma equiperdum* in experimentally infected Mice.**—*Brit. Med. Jl., London,* no. 3175, 5th November 1921, p. 746.

The drug "Bayer 205" has been tested on a virulent strain of *Trypanosoma equiperdum* in mice, a dose of 0·005 grm. per kilogramme of body-weight causing the parasites to disappear. This drug will probably prove more efficient than any hitherto used in cases of sleeping sickness in man, trypanosomiasis of animals, and other diseases such as kala-azar. The therapeutic dose for a man of 70 kgm. should be 0·35 gm., and there is every reason to believe that this and even larger doses can be tolerated. The exact dose will have to be determined by direct trial, and experiments on these lines are now in progress.

FRASER (H.). **Bovine Piroplasmosis.**—*Vet. Record, London,* xxxiii, no. 1742, n.s., i, no. 48, 26th November 1921, pp. 939–944.

An account is given of bovine piroplasmosis as occurring in the Tavistock district of Devonshire. The disease, caused by *Piroplasma*

bigeminum, is usually transmitted by the tick, *Ixodes ricinus*, though *Haemophysalis punctata* may also be a carrier. The maximum infection occurs in May and June, and then dies down, to begin again towards the end of August and September. Warm weather is favourable to the ticks, as it provides them with abundance of grass for shelter. The symptoms of the disease, general methods of treatment, and the intravenous injection of tartar emetic are described. Preventive treatments include keeping cattle away from infected pastures for two years, grazing sheep with cattle, as the ticks attach themselves to the sheep, which are immune, and destruction of ticks by dipping and applications to the skin.

In the discussion following the reading of this paper it was remarked that many cases of the disease were noticed on one farm in cattle on which no ticks could be found, while ticks were as frequently observed on healthy as on diseased cattle. Paraffin washes at 25 per cent. strength have proved fatal to ticks, but the effects only last three or four days. The swim baths that have proved successful in South America are not considered practicable in this country. It is said that clearing the pastures by keeping sheep only on infected areas is only useful if the sheep are frequently dipped. Pastures have been treated with heavy dressings of lime and salt without any result, but on one farm, where the rough grass was burned, the number of cases was certainly reduced. Pasturing with pigs and horses might be of benefit.

Johnston (T. H.) & Bancroft (M. J.). **The Life Histories of** *Musca australis*, **Macq., and** *M. vetustissima*, **Walker.**—*Proc. R. Soc. Queensland, Brisbane*, xxxi, no. 12, 10th January 1920, pp. 181–203, 26 figs. [Received November 1921.]

Musca lusoria, Wied. (*australis*, Macq., *fergusoni*, J. & B.) and *M. humilis*, Wied. (*vetustissima*, Wlk.) are abundant in Queensland in the summer. *M. lusoria* is fairly common also in the winter, except during midwinter. It clusters round the eyes, mouth and nostrils of cattle and horses, feeding on the sweat and mucus, and even blood if a raw surface is available. The larvae are deposited most frequently in fresh cow-dung and sometimes in horse manure. Experimentally the larvae were also deposited in wallaby-dung, but under ordinary conditions this is probably not a normal breeding-place. Before the introduction of cattle and horses into Australia this fly probably bred in decomposing vegetation. The larvae burrow rapidly into the dung, and in hot weather pupate by the third day, but in the winter the larval stage is prolonged to about six days. Under laboratory conditions the larvae will pupate in damp sand. Pupation lasts from 9 to 15 days in summer and 27 to 32 days in winter under artificial conditions, probably slightly less under natural conditions. Among bred flies there is usually a slight preponderance of males, whereas among flies captured on stock the males are decidedly in the minority. Each fly probably deposits about twelve larvae. The adults may be parasitised by larval mites of two species, one of which is probably *Acarus muscarum*, L.

The other fly described in this paper, *M. humilis*, is oviparous. The eggs are laid in a mass below the surface of the dung; they hatch in 24 hours in warm weather. By the fifth day the larvae are mature and have entered upon the resting stage. Pupation lasts about 6 days in the summer and from 10 to 14 days in the winter.

Johnston (T. H.) & Bancroft (M. J.). **Notes on the Chalcid Parasites of Muscoid Flies in Australia.**—*Proc. R. Soc. Queensland, Brisbane,* xxxii, no. 2, 28th April 1920, pp. 19–30, 7 figs. [Received November 1921.]

The bulk of the information contained in this paper has been noticed elsewhere [*R. A.E.*, B, viii, 174].

Johnston (T. H.) & Bancroft (M. J.). **The Life History of** *Habronema* **in Relation to** *Musca domestica* **and Native Flies in Queensland.**—*Proc. R. Soc., Queensland, Brisbane,* xxxii, no. 5, 1st June 1920, pp. 61–88, 7 figs. [Received November 1921.]

Three Nematodes that infest the stomach of the horse in Queensland are transmitted by flies [*R. A.E.*, B, vii, 118]. Of these, *Habronema muscae* and *H. megastoma* may be transmitted by *Musca domestica, M. humilis, M. lusoria, M. terrae-reginae, M. hilli* [*cf. R. A.E.*, B, viii, 189], *Pseudopyrellia, Sarcophaga misera,* and probably other species of *Sarcophaga. Anastellorhina augur* has been experimentally infected with *Habronema,* but apparently it does not normally transmit the parasite.

The larval development of *H. microstoma* occurs in *Stomoxys calcitrans* and *Lyperosia exigua* is also suggested as a possible intermediate host of this species.

The parasitic larvae probably escape from the proboscis of the insect host, whilst the latter is feeding round the horse's mouth, and are swallowed with the saliva. The authors also consider that the larvae are similarly liberated when the fly comes in contact with other surfaces, *e.g.*, the conjunctiva, where they may set up habronemic conjunctivitis, or a sore, in which case they can cause a granuloma.

Johnston (T. H.) & Bancroft (M. J.). **Notes on the Life History of certain Queensland Tabanid Flies.**—*Proc. R. Soc. Queensland, Brisbane,* xxxii, no. 10, 14th September 1920, pp. 125–131, 8 figs. [Received November 1921.]

The Tabanids dealt with are: *Tabanus circumdatus,* Wlk., *T. pallipennis,* Macq., *T. batchelori,* Tayl., and *Silvius notatus,* Ric. As a result of observations made on the three last named during the summer of 1919–20 in Queensland, four weeks is considered to be a possible maximum period for pupation, but as this includes an unknown number of days spent in the larval stage, the figure is merely an approximation.

Johnston (T. H.) & Bancroft (M. J.). **Tick Resistance in Cattle: A Reply to Criticism.**—*Proc. R. Soc. Queensland, 1919, Brisbane,* xxxi, 20th January 1920, pp. 173–180.

This is a reply to criticisms of the authors' work by Pound [*R. A.E.*, B., vii, 114], and substantially maintains their views already published [*R. A.E.*, B, vii, 112].

Hesse (E.). *Ornithomyia avicularia,* **L., auf** *Sitta caesia,* **Wolf.**—*Zeitschr. wiss. Insektenbiol., Berlin,* xvi, no. 11–12, 15th November 1921, p. 236.

An example of the Hippoboscid, *Ornithomyia avicularia,* L., is recorded from the nut-hatch, *Sitta caesia.* This bird has not previously been recorded as a host of the fly.

Mac**G**regor (M. E.). **The Influence of Drought upon Mosquito Life in Surrey.**—*Bull. Ent. Res., London,* xii, pt. 3, November 1921, pp. 205–209.

After the unusual and prolonged drought of 1921, a survey was made of the Surrey district to determine the effect of the weather on the mosquito fauna. Contrary to expectation, it was found impossible to obtain more than a few individuals of *Anopheles maculipennis* (adults), *A. bifurcatus* (larvae), *Theobaldia* (*Culicella*) *morsitans* (larvae, pupae and adults) and *Culex pipiens* (larvae, pupae and adults). The normal conditions of occurrence of these species and their appearance under drought conditions are discussed; other species that occur in normal years, but were practically unobtainable in 1921, include *A. plumbeus, Theobaldia* (*Culicella*) *fumipennis, Aëdes* (*Finlaya*) *geniculatus, A.* (*Ochlerotatus*) *caspius, A.* (*O.*) *punctor* var. *meigenanus* (*O. nemorosus*), *A.* (*O.*) *maculatus* (*waterhousei*) and *Theobaldia annulata.*

It is evident from these records that drought tends to affect mosquitos adversely, decreasing the normal breeding-places and, in the case of certain species, causing them to disappear entirely. It will be interesting to notice whether the species that practically disappeared during the drought will be rare in the same area in future years. Predictions were made at the beginning of the hot weather that there would probably be a great increase in the number of mosquitos, which, taken in conjunction with the numbers of returned ex-soldiers suffering from malaria, would result in many new cases of indigenous malaria. The reverse, however, has been the case, for while the number of indigenous cases in 1920 was thirty-six, those recorded up to 29th August 1921 numbered only four.

Dry (F. W.). **Trypanosomiasis in the Absence of Tsetses, and a Human Disease possibly carried by** *Simulium* **in Kenya Colony.**—*Bull. Ent. Res., London,* xii, pt. 3, November 1921, pp. 233–238, 2 plates.

An investigation into an outbreak of trypanosomiasis of cattle near Kericho, in the Lumbwa country of Kenya Colony, in 1920 revealed the presence of *Trypanosoma uniforme.* Ten cases were recorded before the outbreak was brought to an end by the slaughter of infected animals. A collection of blood-sucking flies and ticks taken in the region included *Haematopota similis,* Ric., *H. hirta,* Ric., *H. brunnescens,* Ric., *H. alluaudi,* Surc., *H. ugandae,* Ric., *Stomoxys calcitrans,* L., *S. varipes,* Bezzi, *S. nigra,* Macq., *Amblyomma variegatum,* F., and *Boophilus* sp. Although there is an extensive area of thick thorn forest in the Chemosit River district of the Lumbwa Reserve, which is almost uninhabited owing to its being infested with *Simulium,* the author's enquiries revealed conclusively that this fly was not a factor in the outbreak of trypanosomiasis in question. It is most likely that the disease was introduced by one or more animals that were infected when they arrived, and was spread by the agency of *Stomoxys.*

The species of *Simulium* infesting the dense thorn forest has been identified as *S. neavei,* Roub. The flies are very active, especially in the afternoon, and while they do not often trouble persons on the march, or those wearing European clothes, natives at rest are almost immediately attacked, especially when the sunshine is not intense. Many natives in this region suffer from a skin affection that they

attribute to the bite of this fly. In some cases of long standing the disease is responsible for an enfeebled condition, but does not apparently cause death. Some individuals recover, but with old people the condition persists until death. It is said that repeated bites are necessary before the disease is contracted; and the fly is said not to enter houses. The clearing of one area of dense and badly infested forest has rendered it a fairly safe district.

PATTON (W. S.). **Notes on the Myiasis-producing Diptera of Man and Animals.**—*Bull. Ent. Res., London,* xii, pt. 3, November 1921, pp. 239–261, 2 plates, 2 figs.

Present information regarding the myiasis-producing Diptera is very incomplete, and it is with the object of extending the study of these flies from other parts of the world, particularly from Malaya, the Dutch East Indies, China, Japan, Australia and tropical America, that this useful summary is compiled, partly from the author's own observation and partly from the works of Rodhain, Bequaert, Roubaud, and others. The flies most usually causing myiasis in India are *Chrysomyia bezziana*, Vill., which is also the most important myiasis-producing Calliphorine of Africa [*R. A. E.*, B, ix, 53, 103], *C. megacephala*, F., *Lucilia argyricephala*, F., *Sarcophaga* sp., *Aphiochaeta xanthina*, Speis., and *A. rufipes*, Meig.

The myiasis-producing Diptera, including those producing specific, semi-specific and accidental myiases are classified; keys are given to the genera of the OESTRINAE from Rodhain and Bequaert, and to those of the CUTEREBRINAE, and also one for the identification of some of the larvae of myiasis-producing Diptera, chiefly Muscids. Notes are given on many of the species concerned and on methods of rearing larvae for identification purposes.

EDWARDS (F. W.). **A Revision of the Mosquitos of the Palaearctic Region.**—*Bull. Ent. Res., London,* xii, pt. 3, pp. 263–351, 18 figs.

In this revision the geographical limits adopted are those most usually given to the Palaearctic Region, viz., Europe, North Africa (as far south as the tropic), the Atlantic Islands, Asia Minor, North Arabia (including the head of the Persian Gulf), North Asia (as far as the Himalayas), North China, and Japan. No mosquitos have yet been recorded from Iceland. The mosquito fauna is fairly homogeneous over the greater part of the area, but there are two parts that would seem to be better classed in the Oriental region. In the area round the head of the Persian Gulf there is a very large, perhaps predominating, admixture of Oriental forms, while in the southern islands of Japan, at least as far north as Tokio, the fauna appears to be almost purely Oriental.

The number of species of mosquitos found in all is ninety-four, and of these seventy may be said to comprise the true Palaearctic fauna (though a number of them spread into adjoining regions), while the remainder are intrusions from the Oriental and Ethiopian regions. There are considerable differences between the North European and Mediterranean faunas. The North European shows very strong affinities to the Nearctic fauna, and a considerable number of the species seem to be common to both Europe and North America, while others have obviously representative forms in the two regions. Of the former nearly all the species are already known to occur throughout

Europe and Siberia, and the two faunas may therefore be assumed to have mixed at a recent date by way of Eastern Siberia and Alaska. In a list of the latter it is noteworthy that none of the European species are at present known from Asia.

In the more northerly parts of the region the dominant group is the subgenus *Ochlerotatus* of *Aëdes.* The species of *Anopheles* that occur are all of the typical subgenus. Further south *Ochlerotatus* rapidly disappears and begins to be replaced in part by species of *Culex* and in part by other subgenera of *Aëdes,* while the Anophelines of the subgenus *Myzomyia* become numerous.

In dealing with the classification of the CULICIDAE the genera have been defined on characters that have no relation to sex and that do not depend on the superficial characters of the scales. Several of the new distinctions employed are to be found in the thoracic chaetotaxy.

Keys are given to the adults and larvae of *Anopheles* (*Anopheles*) and *Anopheles* (*Myzomyia*) ; to the genera of the Culicines ; to the adults and larvae of *Theobaldia,* as well as to the three subgenera *Theobaldia, Culicella* and *Allotheobaldia* ; to the subgenera of *Aëdes* ; to the larvae of the species of *Aëdes* (*sens. lat.*) ; to the adults of *Aëdes* (*Ochlerotatus*), *Aëdes* (*Finlaya*) and *Aëdes* (*Stegomyia*) ; and to the adults and larvae of *Culex,* indicating in the case of the adults the subgenera as well as the species. In the case of all the keys to species, except that to the species of *Anopheles* (*Myzomyia*), a second key based on the male hypopygium is given as well as the one based on other characters.

The new species described are : *Anopheles* (*Anopheles*) *elutus,* which was previously recorded as *A. maculipennis* var. [*R.A.E.*, B, ix, 98, 159], but which entirely replaces *A. maculipennis* in Palestine, Lower Mesopotamia and Transcaspia, though in Macedonia the two occur together ; *A.* (*A.*) *punctibasis* from Japan ; *Aëdes* (*Ochlerotatus*) *freyi* from Finland and Germany ; *A.* (*O.*) *albescens* from West Siberia ; *A.* (*O.*) *parvulus* from Finland ; *A.* (*Stegomyia*) *cretinus* from Crete ; *Lutzia vorax,* the larvae of which were found in old cesspits preying upon *Culex fatigans,* from Japan and North India, and probably widely distributed in the Oriental region ; and *Culex* (*Culex*) *orientalis* breeding in rice fields in Japan. *Anopheles* (*Myzomyia*) *turkhudi* var. *persicus,* n., is described from East Persia (the typical *A. turkhudi* inhabiting adjacent areas in the Punjab). *Barraudius,* a new subgenus of *Culex,* is also described, the type species being *C. pusillus,* Macq., and *C. modestus,* Fic., being the only other included.

Among the species in which changes in or additions to the synonymy are made are : *Anopheles* (*Anopheles*) *algeriensis,* Theo. (*lukisi,* Christ.) ; *A.* (*A.*) *bifurcatus,* L. (*claviger,* Mg., *antennatus,* Beck.) ; *A.* (*A.*) *maculipennis,* Mg. (*claviger,* F., nec Mg., *occidentalis,* D. & K., *lewisi,* Ludl., *selengensis,* Ludl.) ; *A.* (*A.*) *mauritianus,* Grp. (*paludis,* Theo.) ; *A.* (*Myzomyia*) *superpictus,* Grassi (*palestinensis,* Theo.) ; *Theobaldia* (*Allotheobaldia*) *longiareolata,* Macq. (*Culex annulatus* var. *marocanus,* d'Anfr.) ; *T.* (*Theobaldia*) *glaphyroptera,* Schiner (*bergrothi,* Edw.) ; *T.* (*T.*) *alaskaensis,* Ludl.(*siberiensis,* Ludl., *arctica,* Edw.) ; *T.* (*Culicella*) *fumipennis,* Steph. (*ficalbii,* Noé) ; *Orthopodomyia pulchripalpis,* Rond. (*albionensis,* MacGr.) ; *Aëdes* (*Ochlerotatus*) *dorsalis,* Mg., nec Theo. et al. (*maculiventris,* Macq., *curriei,* Coq., *broquettii,* Theo., *grahami,* Ludl.) ; *A.* (*O.*) *lutescens,* F. (*cyprius,* Ludl.) ; *A.* (*O.*) *alpinus,* L., (*innuitus,* D. & K., *nearcticus,* Dyar) ; *A.* (*O.*) *sticticus,* Mg. (*concinnus,* Steph., *nigripes* var. *sylvae,* Theo.,

nigrina, Eckst., *nemorosus* var. *dorsovittatus*, Vill.) ; *A.* (*O.*) *communis*, De G. (*nemorosus*, Mg., *obscurus*, Mg., *lazarensis*, Felt & Young, *palmeni*, Edw.) ; *A.* (*O.*) *pullatus*, Coq. var. *jugorum*, Vill. (*metalepticus*, Dyar, *gallii*, Martini) ; *A.* (*Stegomyia*) *vittatus*, Big. (*S. sugens*, Theo.) ; and *Culex* (*Culex*) *apicalis*, Adams (*sergenti*, Theo.). The author also now adopts *Aëdes* (*Stegomyia*) *argenteus*, Poiret, for *Stegomyia fasciata*, F.

DYAR (H. G.). **The Mosquitoes of Canada.**—*Trans. R. Canad. Inst., Toronto*, xiii, pt. 1, 1921, pp. 71–120. [Received 22nd November 1921.]

A key is given to the tribes and genera of Canadian mosquitos, and also to the Canadian species of certain genera, including *Anopheles*. The four Anophelines that occur in Canada are: *A. punctipennis*, Say, *A. walkeri*, Theo. (which may or may not be a malaria carrier), *A. maculipennis*, Meig. (*occidentalis*, D. & K.), and *A. quadrimaculatus*, Say.

Brief descriptions are given, with notes on the distribution and habits of each of the 53 species dealt with. The genus most abundantly represented is *Aëdes*, but *Culex* spp., though absent from the northern forests, are found in the warmer, open country, and especially in cities [*cf. R.A.E.*, B. viii, 105 ; ix, 101].

The Thread Worm, *Gongylonema hominis*, **introduced into Man by Insects ?**—*Ent. News, Philadelphia*, xxxii, no. 9, November 1921, pp. 280–281.

A case is recorded from Georgia of infection of the human mouth by a species of *Gongylonema*, for which Stiles suggests the name *G. hominis*. Similar infections are widespread among cattle, sheep, rats, etc. Infection probably occurs by swallowing insects such as croton bugs [cockroaches].

Jaarverslag der Malariacommissie voor Noordholland over 1920. [Annual Report for 1920 of the Malaria Committee for the Province of North Holland.]—Reprint from *Verslagen en Meded. Volksgezondheid* [*sine loco*], 1921, no. 3, 23 pp. [Received 21st November 1921.]

The Committee began work in December 1919 and investigated *inter alia* the occurrence and habits of Anophelines in and around Amsterdam, Haarlem and Zaandam.

In summer these mosquitos occur nearly everywhere, especially in buildings housing domestic animals, and also in dwellings. In autumn outdoor conditions become unfavourable to both Anophelines and Culicines. The males die, and instead of maturing eggs the females develop the fat-body and no longer travel considerable distances. In warm and sheltered surroundings they sometimes feed in winter, and in one instance, during a sharp frost in December, at least 10 per cent. of the Anophelines captured indoors contained blood. Though this case is probably exceptional, the difference in the case of Culicines is marked, and *Culex pipiens* seems not to bite at all in winter. Stables for horses were chiefly infested, while it was exceptional to find many Anophelines in cowsheds. Dry and well-closed pigsties, however, contained many. Stables near the centre of towns were less infested than those at the outskirts.

Anophelines in this province apparently prefer horses to cattle in sheds where both are present. Cowsheds are also less infested because they are less dry ; further, in the area investigated, cows are pastured until late October or mid-November, by which time the Anophelines have already chosen their winter quarters.

In dwellings Culicines are found in the cellars and Anophelines in the attics, especially in those that are slept in. Anophelines are not usually numerous, but in a garret in a working-class dwelling at Amsterdam 350 were caught in February.

The disinfestation of stables at Amsterdam was done with a vacuum cleaner or with petroleum. For petroleum a flat tray was used containing wadding soaked in the liquid. By holding the tray close to the ceiling for a few seconds the mosquitos were caused to fall into it. Both these methods permitted counts of the numbers present. In one stable the catches ranged in consecutively decreasing numbers from 6,500 on 21st February to 250 on both 23rd and 29th April. As new adults could not appear before May, those captured at the later dates must have escaped the first disinfestations or have come from other places.

On 30th March the first find was made of larvae, apparently those of *A. bifurcatus*, which hibernates in the larval stage. It is of little practical importance in Holland, as it is not a domestic species. At the end of June larvae of *A. maculipennis* were taken in water among sand dunes from one to two miles from the nearest building, so that this species is not necessarily a domestic one. In and around Amsterdam the first larvae were found on 4th May and the last on 14th October. The first males occurred on 27th May in a stable and on 7th June in a dwelling. Males of *Culex* were taken indoors on 12th May.

As regards the incidence of malaria, it is stated that 2,309 *Anopheles* were caught in houses where there were cases of this disease. In summer the percentage of infection in such mosquitos was only 0·7, but a maximum of 7 was reached in November.

In the province of North Holland the dykes are cleaned and repaired in September. If the work could be done a month earlier, when the larvae are most abundant, large numbers would be destroyed. If a second cleaning is possible and could be arranged for the second half of May, a large portion of the first brood would be destroyed.

Korteweg (P. C.) & Swellengrebel (N. H.). **Wanneer heeft ten onzent de Malariabesmetting plaats ?** [At what Period does Infection with Malaria occur in our Country ?]—Reprint from *Nederl. Tijdschr. voor Geneesk.* [*sine loco*], lxv, 1921, 2nd Half no. 12, pp. 1485–1488. [Received 21st November 1921.]

In the first part of this paper Dr. Korteweg states that the study of malaria in Holland is simplified because only *Plasmodium vivax* and *Anopheles maculipennis* are involved in practice, but that a complication is introduced by the difference in the habits of Anophelines in town and country communities, especially as in the latter there are many dykes, and stables and cowsheds are built among the dwellings.

To ascertain the period when man is infected a distinction must be made between primary cases and relapses. Children under one year have a great degree of immunity. Investigations from 1903 to 1918 show that of 534 primary cases, 125 occurred before June. Koch has suggested that primary cases in spring are due to the warm indoor

conditions permitting the malarial organism to develop in the mosquito, but the author considers that many of these primary cases have remained latent after infection in the preceding autumn. In autumn Anophelines are very abundant indoors, and in September and early October the temperature permits the cysts to mature in the mosquito. In spite of this there are few primary cases in October and November. The same reason that prevents relapses in late autumn and winter postpones first attacks until the spring.

Assuming an autumn infection in many spring primary cases, many of the latter may be expected to originate in families in which malaria occurred after 1st September in the previous year. This seemed to hold good in 20 out of 146 primary cases noted before 1st June. On dividing the families concerned into two groups, in which malaria had occurred before or after 1st November, the latter group seemed connected with 2 only of the 20. It is therefore probable that mosquitos are not easily infected after 1st November. It is possible to find a like relation between the spring primary cases and early spring relapses in the same families, and this relation is a feasible one as regards time. Investigations indicated, however, that persons harbouring latent malaria in spring do not give Anophelines an opportunity to become infected.

In the second part of the paper Dr. Swellengrebel points out that, in order to state when man becomes infected, it is important to ascertain the occurrence of infection in Anophelines and compare this in order of date with the human infection.

For this purpose Anophelines were caught in houses where malaria had occurred. The results, which are admittedly incomplete, show that the maximum infection of these mosquitos occurred in late autumn. At Amsterdam no infection was found before August, and the maximum reached was 6·6 per cent. in November. At Nieuwendam the maximum was in October and November, but was below 2 per cent., while infections occurred in March and June to the extent of 1 per cent. in each month. This difference between Amsterdam and Nieuwendam may be explained as follows. In summer the mosquitos leave buildings to oviposit and are unlikely to return to the same ones. Stables and cowsheds are very attractive, and infected mosquitos are difficult to find among the large numbers that occur in them ; their numbers are also constantly being added to by newly emerged individuals. The chance of finding infected mosquitos was therefore very small in summer, but greater at Nieuwendam than at Amsterdam as there was more malaria in the former locality. In winter Anophelines do not oviposit, and therefore come out of buildings much less and travel shorter distances. They thus remain congregated indoors and infect the neighbouring dwellings. At Nieuwendam, however, stables and cowsheds are interspersed with dwellings, and there is a chance of their sheltering in the former after even a short excursion out of doors, so that they do not congregate inside malaria-infected houses to the same extent.

As regards the development of winter infections, Dr. Swellengrebel states that in December, January and February he found four mosquitos with sporozoites in the salivary glands; the infection can therefore develop in winter. Furthermore, in 7 out of 18 infected mosquitos caught in November the state of development of the oocysts pointed to the maturing of sporozoites. Studies of development showed that after October no small or half-grown oocysts were found,

and that therefore no new infections of the mosquito took place after that date. It was not until February that half-grown oocysts were again found.

It is often said that mosquitos cannot become infected during hibernation, because they no longer suck blood. This is incorrect as regards Anophelines, at least in Holland, where they feed throughout the winter in houses and, even more so, in stables and cowsheds.

These findings disagree with the very general view that no infected Anophelines can be found in winter, or that if there be infected individuals their oocysts will degenerate without maturing.

The fact that in man malaria occurs mostly in summer and not in winter, when a greater percentage of infected Anophelines occurs indoors, is easily understood if it is remembered that in summer there are many more Anophelines and that they suck blood more frequently. With regard to the point that in winter almost no new human infections are observed, Dr. Swellengrebel's investigation shows that oocysts can mature in winter, and the supposition that the sporozoites lose their virulence during prolonged residence in the salivary glands loses its force in view of the fact that Anophelines feed in winter. It is therefore thought that man can be infected with virulent sporozoites in winter without this becoming apparent. This leads to the assumption that a portion of the primary spring human cases are due to this cause. Whether all such spring cases may be thus explained depends on further spring investigations.

LEPNEVA (S. G.). *Anopheles maculipennis,* **Meigen. В Окрестностях Саратова.** [In the Environs of Saratov.]—**Труды Саратовского Общества Естествоиспытателей и Любителей Естествознания.** [*Trans. Saratov Soc. Naturalists*], viii, no. 1, **Работы Волжской Биологической Станции** [*Work of the Volga Biol. Sta.*], *Saratov*, v, no. 4–5, 1921, pp. 250–253. [Received 23rd November 1921.]

Anopheles maculipennis, Meig., has been found breeding in practically all collections of water examined in the environs of Saratov. In a part of the town known to be highly infected with malaria no Anopheline larvae were found. This may be accounted for by the polluted state of the river and the absence of vegetation in it; the main breeding area is apparently a neighbouring lake, and from this the adult Anophelines invade the town.

A brief summary in German is appended to this paper.

Profilaxis de la Peste. Estudios para el Saneamiento de Bolsas de Arpillera. [Plague Prophylaxis. Studies on the Cleansing of Bags made of Sacking.]—*Anales Dept. Nac. Higiene, Buenos Aires*, xxvii, no. 3, May–June 1921, pp. 105–115. [Received 23rd November 1921.]

The majority report of a committee studying the question of freeing grain bags from plague germs and rat-fleas recommends further experiments with a chamber in which hot air is kept in motion [*cf. R. A. E.*, B, ix, 197, 198]. A minority report, signed by Dr. R. Kraus, recommends further investigation on the question of hot circulating air and hot still air, for if the latter gives as good results—as researches made hitherto appear to indicate—this will enable a very simple type of air chamber to be used.

BACHMANN (A.). **Programa de Lucha para Llevarse a Cabo en Famaillá contra los Anófeles y sus Larvas.** [Programme of Work to eliminate Anopheline Mosquitos and their Larvae at Famailla.]—*Anales Dept. Nac. Higiene, Buenos Aires,* xxvii, no. 3, May–June 1921, pp. 117–137, 8 figs. [Received 23rd November 1921.]

Most of the information in this paper has been recently noticed from another source [*R. A.E.*, B, x, 13].

As chronic cases of malaria abound, it is clear that dwellings are dangerous foci of infection, and they should be fumigated periodically in order to destroy the adult mosquitos. A mixture of pitch and sawdust is a simple but effective fumigant. This may be used three times a month in summer, twice a month in autumn, and once a month in winter, but these times should be modified in accordance with the prevailing temperature, as the malarial parasite develops in 10–12 days at 77° F. (25° C.), but requires almost double the time at 68° F. (20° C.) and does not develop under 59° F. (15° C.).

Some aquatic plants, such as *Myriophyllum brasiliense, Lemna,* and *Pistia stratiotes*, appear to be avoided by mosquito larvae. On one estate *M. brasiliense* is being planted along the streams at points where breeding-places have been cleared away.

Saneamiento antipalúdico en la Zona del Canal de la Cuarteada (Stgo. del Estero). [Anti-malarial Drainage in the Zone of the Cuarteada Canal in the Province of Santiago del Estero.]—*Anales Dept. Nac. Higiene, Buenos Aires,* xxvii, no. 3, May–June 1921, pp. 157–163, 3 plates, 1 map. [Received 23rd November 1921.]

This article describes the drainage and reclamation works on an old branch of the canal. Rain-water and filtration from the present irrigation canal had formed a tract of stagnant water about $1\frac{3}{4}$ miles long, 150 feet wide and 6 feet deep. Oiling, the supply of mosquito-nets and quinine, and the planting of 1,500 poplars and *Eucalyptus* supplemented the main work.

SÉGUY (E.). **Les Diptères qui vivent au Dépens des Escargots.** [Diptera that live on Snails.]—*Bull. Soc. Ent. France, Paris,* 1921, no. 16, 26th October 1921, pp. 238–239.

In addition to the cases previously recorded of certain Diptera that are parasitic upon snails [*R. A.E.*, B, viii, 24 ; A, viii, 472], the following all live, at some period of their development, at the expense of the snail, *Helix aspersa* :—The larvae of *Musca domestica*, L., may be parasitic, though recent attempts to rear them on *Helix* have all been negative. Larvae of *Sarcophaga melanura*, Meig., attack the mollusc in much the same way as those of *M. domestica*, but destroy it more rapidly. A slug, *Arion fuscus,* infested with several of these small larvae died two days after it was first observed, and decomposed into a liquid almost immediately afterwards, the decomposition being accelerated by the development of the larvae. Pupation occurred on the tenth day after the death of the host, and eight days later the adults emerged. *S. carnaria,* Meig., is an occasional parasite of *H. aspersa* and destroys it in the same manner. *S. soror*, Rond., was found parasitic in the same snail as *S. melanura* and *S. carnaria.*

To the flies mentioned as capable of developing in the dead bodies of snails must be added *Calliphora erythrocephala*, Meig., *Phora giraudi*, Egg., *Muscina stabulans,* Fall., which may be a true parasite, *Fannia*

canicularis, L., and *F. scalaris*, F., obtained from decomposing individuals of *Helix*, and *Ravinia haematodes*, Meig., from dead snails. The larvae of the last named usually feed on excrement.

Trico (P.). **El Bañadero de las Ovejas.** [The Sheep-Dipping Tank.] —*Gaceta Rural, Buenos Aires*, xv, no. 171, October 1921, pp. 329–337, 3 figs.

Full directions are given for the construction of a dipping tank for sheep similar to one now being built in the province of Buenos Aires.

Dunn (L. H.). **The Lake Mosquito, *Mansonia titillans*, Wlk., and its Host Plant, *Pistia stratiotes*, Linn., in the Canal Zone.**—*Proc. Med. Assoc. Isthmian Canal Zone, January–June 1918, Mount Hope, C.Z.*, xi, pt. 1, 1921, pp. 7–20. [Received 29th November 1921.]

The information contained in this paper on *Taeniorhynchus* (*Mansonia*) *titillans* has already been noticed [*R. A.E.*, B, vii, 3].

Dunn (L. H.). **The Tick as a possible Agent in the Collocation of the Eggs of *Dermatobia hominis*.**—*Proc. Med. Assoc. Isthmian Canal Zone, January–June 1918, Mount Hope, C.Z.*, xi, pt. 1, 1921, pp. 21–25. [Received 29th November 1921.]

The information contained in this paper has already been noticed [*R. A.E.*, B, vii, 10].

Dunn (L. H.). **Studies on the Iguana Tick, *Amblyomma dissimile*, in Panama.**—*Proc. Med. Assoc. Isthmian Canal Zone, July–December 1918, Mount Hope, C.Z.*, xi, pt. 2, 1921, pp. 7–18. [Received 24th November 1921.]

The contents of this paper have been noticed from another source [*R. A.E.*, B, vii, 44].

Hanson (H.). **A Review of the Malaria Incidence on the Canal Zone. (Period 1904 to 1918, inclusive.)**—*Proc. Med. Assoc. Isthmian Canal Zone, January–December 1919, Mount Hope, C.Z.*, xii, pt. 1–2, 1921, pp. 27–29. [Received 24th November 1921.]

A review of the incidence of malaria among employees of the Panama Canal from 1904 to 1918 shows an increased rate of total cases for 1918. This is probably accounted for by the large number of men working where active mosquito control could not be practised. The rate within the areas where regular sanitation is practised is progressively decreasing; this decrease can, however, only be maintained by unrelenting vigilance. Algae soon form in neglected drains, and thus afford favourable conditions for the breeding of *Anopheles albimanus*.

Hanson (H.). **A Study of Sanitary Conditions in Peru with special Reference to the Incidence of Malaria.**—*Proc. Med. Assoc. Isthmian Canal Zone, January–December 1919, Mount Hope, C.Z.*, xii, pt. 1–2, 1921, pp. 41–54, 18 plates. [Received 24th November 1921.]

The sanitary conditions of Lima and its suburbs are described. Mosquito breeding is very prevalent, but could be controlled and finally eradicated if attacked in a systematic and intelligent manner. *Anopheles* breed most extensively in the river bed at Chosica, in the seepage areas at Surco and in the swamp on the Lima–Ancon railway.

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Cunliffe (N.). **Some Observations on the Biology and Structure of** *Ornithodorus moubata,* **Murray.**

Nuttall (G. H. F.). **A Note on the External Characters which serve to differentiate the Sexes.**—*Parasitology, Cambridge,* xiii, no. 4, November 1921, pp. 327–347, 1 plate, 5 figs.

The observations recorded in this paper were made in 1913–14 in continuance of an investigation begun by the late Mr. Gordon Merriman. Very little information was available regarding the biology of *Ornithodorus moubata* ; the present study was made to determine the number of moults before and after reaching maturity, the changes taking place in the external anatomy of the ticks at each stage of development, and the duration of the different stages at different temperatures. Pairing was observed between individuals of the two species, *O. moubata* and *O. savignyi,* the resulting eggs being infertile. There is no evidence of parthenogenesis in *O. moubata,* nor do the ticks undergo ecdysis after reaching maturity.

The influence of temperature on oviposition is very marked. An increase of temperature of 8° C. [14° F.] from 22° C. [72° F.] doubles the rate of oviposition, but decreases the fertility of the eggs by 30 per cent. It also reduces the longevity of the female tick from 715 to 397 days (*i.e.*, 40 per cent.), and approximately halves the period required for metamorphosis under laboratory conditions. Under these conditions, at 37° C. [99° F.] reproduction ceases and the longevity of the female is reduced by 80 per cent. From four to eight ecdyses may be undergone before maturity is reached, the majority of males maturing after the 5th ecdysis, and the females about equally after the 5th and 6th ecdyses. Engorgement can take place one or two days after emergence at any stage except the larval, the average time required being about three-quarters of an hour. The extent of engorgement at each stage varies, but is not correlated with the ecdysis period. Excessive moisture does not retard ecdysis, but is decidedly unfavourable to vitality, only one tick passing the 3rd nymphal stage under these conditions. This result is of particular interest in relation to Rodhain's observations on the distribution of *O. moubata* in tropical Africa [*R. A.E.*, B, vii, 151].

A study of the structure of the hypostome, leg and spiracle leads to an approximate determination of the stage of development attained. The larval and first four nymphal stages are fairly well differentiated, much more so than the later stages, but variation due to nutrition requires further study.

MacGregor (M. E.). **The Influence of the Hydrogen-Ion Concentration in the Development of Mosquito Larvae. (Preliminary Contribution.)**—*Parasitology, Cambridge,* xiii, no. 4, November 1921, pp. 348–351.

As a result of experiment and investigation, the author concludes that the frequent failure of mosquito larvae to develop normally under laboratory conditions is largely due to changes in the hydrogen-ion concentration, which evidently has a great effect on metabolism of the larvae and their resistance to disease. It may, therefore, be possible to combat mosquito development by making the water of ponds acid and of tree-holes alkaline. Such methods would naturally have a limited practical application. Further investigations are proceeding.

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Duke (H. L.). **On the Zoological Status of the Polymorphic Mammalian Trypanosomes of Africa and their Relation to Man.**—*Parasitology, Cambridge*, xiii, no. 4, November 1921, pp. 352–397.

The arguments put forward in this paper are suggested as a working hypothesis for future research. The author is convinced that the physiological characters, in any strain of trypanosomes, are largely determined by environment. If the arguments advanced are sound, it may be concluded that the polymorphic mammalian trypanosomes of Africa all belong to a single species, though the species includes many varieties or strains, which are variable and are determined by the environment in which the species lives.

Jack (R. W.). **Ticks infesting Domestic Animals in Southern Rhodesia.**—*Rhodesia Agric. Jl., Salisbury*, xviii, no. 4, August 1921, pp. 361–371, and no. 5, October 1921, pp. 480–493, 4 plates.

This paper gives a popular résumé of previously published information regarding the ticks infesting stock and domestic animals in Southern Rhodesia, and is written chiefly for the use of stockmen and those interested in the cattle industry. An account is given of the life-histories of the ticks, their habits, relation to animal diseases, and the measures employed for their control [*R. A.E.*, B, i, 23–25, 139; vi, 32; ix, 8, 83–85, etc.]. A list is given of the diseases known to be transmitted by South African ticks, the hosts affected and the species of ticks that are carriers.

Morris (H.). **Anthrax: Transmission of Infection by non-biting Flies.**—*Louisiana Agric. Expt. Sta., Baton Rouge*, Bull. 168, May 1919, 12 pp. [Received 30th November 1921.]

This paper is supplementary to a previous bulletin dealing with blood-sucking insects as transmitters of anthrax [*R. A.E.*, B, vi, 181]. Experiments are described in which *Musca domestica, Calliphora erythrocephala, Lucilia caesar* and *L. sericata* are proved to be capable of carrying anthrax infection to wounds on healthy animals after feeding on anthrax-infected flesh. *M. domestica* and *S. calcitrans* are similarly capable of transmitting infection after feeding upon discharges from an open carbuncular swelling on an animal suffering from anthrax. Flies bred out of an unopened anthrax carcass during the summer months in Louisiana did not carry anthrax infection, though the indications are that flies bred in the presence of anthrax spores carry the infection, and it is therefore probable that the vegetative form of anthrax in the unopened carcass is destroyed by the process of decomposition.

The results obtained in this work prove the necessity for prompt and complete destruction of all anthrax-infected carcasses, and the desirability of warning the public against the dangerous and useless practice of opening anthrax swellings on infected animals. Animals should be given greater protection against all insects during anthrax outbreaks.

Wolbach (S. B.). **Studies on Rocky Mountain Spotted Fever.**—*Jl. Med. Res., Boston, Mass.*, xli, no. 1, November 1919, pp. 1–197, 21 plates, 4 maps, 10 charts.

The pathology of Rocky Mountain spotted fever is described, and the anatomy, habits, hosts, biology and behaviour towards infection

of the usual carrier, *Dermacentor venustus*, are dealt with. The author believes that hereditary transmission in many generations of this tick helps to maintain the disease without fresh introductions from a mammalian source. The existence of local foci of infection would indicate that this is an important factor in maintaining the virus in nature. Ticks do not travel great distances except on the host, and only the larger host animals have a wide range. These and other factors must tend to retard the extension of the areas occupied by infected ticks.

The author treats the causative organism as in an intermediate position between bacteria and protozoa, and proposes the name *Dermacentroxenus rickettsi* for it.

There is a strong clinical resemblance between this disease, typhus and tsutsugamushi disease.

MANSON-BAHR (P.). **Experiences of Malaria in the Egyptian Expeditionary Force.**—*Lancet, London*, no. 5028, 10th January 1920, pp. 79–85, 6 figs., 1 map.

The observations here recorded are divided into two portions, the first concerning Egypt and the Suez Canal Zone, and the second Palestine.

During August and September 1916, there was a relative scarcity of Anophelines in the southern sector of the Canal Zone. The most abundant species were *Anopheles* (*Cellia*) *pharaoensis*, *A turkhudi* and *A. mauritianus*. The two former bred in the borrow-pits near the Sweet Water Canal and in the seepage water from the subsidiary channels, but not in the canal itself, owing to the large numbers of surface-feeding fish. *A. mauritianus* bred in highly saline water in the vicinity of the Bitter Lakes. *A. pharaoensis* is a recognised carrier of the parasite of benign tertian, while *A. mauritianus* has never been proved to be a vector. Transmission by *A. turkhudi* of the malignant parasite has been proved experimentally, *A. pharaoensis* being but a casual transmitter of this disease.

In the Fayoum, *A. pharaoensis* was the most abundant species in the Western Oases, and a number of subacute cases of malaria occurred in January 1917, ten days after the arrival of the troops. Among the points noted are the fact that malignant tertian malaria could be transmitted during the winter, when the surface temperature of the sand at night was as low as 1° C. [34° F.], and the high rate of infection amongst the native population, the children under 14 having a splenic index of 96·4 per cent. The mosquito concerned was either *A. superpictus* (*palestinensis*) or perhaps a variety of *A. turkhudi*, of which large numbers were breeding in the warm springs (temperature 80° F.) watering the Dahkla oasis throughout the winter.

In Palestine, malaria, particularly of the malignant variety, was apt to assume epidemic form during the autumn months, especially mid-October. The cases that occurred were such as to warrant the suspicion that the infection had been locally acquired during the winter months. The Anophelines infected during the previous autumn appeared to be capable of conveying the infection during the winter to troops quartered in native houses. Females of *A. bifurcatus* were proved to be capable of ovipositing in winter, the eggs yielding active larvae in sheltered places, such as deep wells. On the seaboard and the plain of Sharon, the benign variety of malaria predominated, while east of Jerusalem the

converse was the case. The main vector in the region appears to be *A. maculipennis* [*elutus*, *cf. R.A.E.*, B, x, 18], and in the Jordan valley, *A. superpictus* (*palestinensis*). Other species found were *A. fragilis*, *A. bifurcatus*, and *A. turkhudi*.

ZUELZER (M.). **Biologische Untersuchungen an Zecken.** [Biological Investigations on Ticks.]—*Zeitschr. Immunitätsforschung u. exper. Therapie*, *Jena*, xxx, no. 2, 7th September 1920, pp. 183–201.

These investigations relate especially to *Argas persicus*, *A. reflexus* and *Ornithodorus moubata* having been used for comparison.

A. persicus likes warm and dry surroundings, 26° C. [79° F.] being the optimum temperature, and prefers darkness, hiding in cracks and fissures. It can fast for three or four months, but the statement that it can remain without food for a year is probably incorrect. If opportunity offers, it will suck blood every three or four weeks. After the meal, and only rarely during it, the distended tick secretes a drop of clear coxal fluid (weighing about as much as a fasting tick); its normal flat and wrinkled appearance then returns, and it will suck again with renewed energy. *A. reflexus* behaves similarly, but *O. moubata* fairly regularly excretes the fluid while actually feeding. To ascertain what part this fluid may play in the transmission of spirochaetes, nine individuals of *O. moubata*, harbouring the spirochaete of relapsing fever, were fed on a healthy rat, and the coxal fluid was collected and injected intraperitoneally into a healthy mouse, producing severe relapsing fever with abundant spirochaetes in the blood. In this case the coxal fluid alone was responsible for the infection. Experiments are being made to ascertain whether only the secretion is infective or whether the actual bite can also be so, as in the case of lice. Other blood-suckers such as *Culex*, *Cimex lectularius* and *Pulex* ingest more blood than they require, but in the absence of coxal glands, the undigested matter is excreted with the faeces.

All important functions in the life of a tick are directly dependent on the ingestion of food. Neither pairing nor oviposition occurs during a period of fasting. After a meal, pairing may occur within from ½ to 2 hours. The female will pair for two or three days after a meal, and the male for a period up to thirty-two days. Females that had been fertilised after a previous meal oviposited after a new meal without a new pairing being necessary. After pairing, oviposition occurs in from five to fourteen days. The first eggs of a batch are laid singly. Each oviposition lasts three to six days, the number of eggs varying from 30 to 275, according to the amount of food and, perhaps, the date of pairing. A couple, known to be four years old, paired, and the female then laid 50 eggs. Specimens fed on guinea-pigs for years appear normal, but lay a reduced number of eggs.

The eggs of *A. persicus* have an incubation period of 5–6 days in summer and 20–25 in winter. The first larval moult occurred after a minimum of 15 days in summer and 28 in winter. After each of the four moults the nymph of *A. persicus* must suck blood at once. The total minimum time from the deposition of the eggs to oviposition by the next generation female is nearly six months in winter and about three in summer.

Herms (W. B.). **Malaria Drainage Operations at the Port of Embarcation, Newport News, Virginia.**—*Milit. Surgeon, Washington, D.C.*, xlvii, no. 1, July 1920, pp. 81–93, 1 fig. (Abstract in *Sanit. Supplements, Trop. Dis. Bull, London*, no. 1, 30th March 1921, pp. 2–3.)

The drainage and oiling of several swamps surrounding the camps near Newport, Virginia, are described. The Anophelines occurring in this vicinity, in order of abundance, are *Anopheles quadrimaculatus*, *A. crucians* and *A. punctipennis*. *A. quadrimaculatus* occurred in the so-called typical Anopheline breeding-places, such as wayside pools, neglected ditches and the borders of impounded water; *A. crucians* in the neighbourhood of slightly brackish water; and *A. punctipennis* in wooded areas. The last two were the first to appear and persisted in some numbers during the entire summer; *A. quadrimaculatus* appeared somewhat later and rapidly became the predominant species.

Fricks (L. D.). **Emergency Measure and Foresight in Malaria Control.** —*Milit. Surgeon, Washington, D.C.*, xlvii, no. 2, August 1920, pp. 224–229. (Abstract in *Sanit. Supplements, Trop. Dis. Bull., London*, no. 1, 30th March 1921, p. 2.)

The necessity for an organisation capable of promptly applying anti-mosquito operations in malarious districts is discussed in the light of experience gained in connection with the location of military camps in malarious regions. The measures described are those usually employed. An endeavour to kill all engorged mosquitos in houses is advocated as a sound preventive measure.

Howard (H. H.). **Malaria Control in Rural Communities by Anti-mosquito Measures.**—*Southern Med. Jl., Birmingham, Ala.*, xiii, no. 4, April 1920, pp. 260–266.

An area of thirty-six square miles in Hinds County, Mississippi, with a population of 830, was used for an experiment with top minnows, *Gambusia affinis*. Various collections of water, 228 in number, of which 61 did not at any time breed Anophelines, were kept under observation. *G. affinis* was placed in those waters that did not already contain this fish. As a result, 90 per cent. of the potential breeding-places were controlled by it. Where larvae still occurred, their presence was attributed either to an insufficient number of fish or to the presence of too much vegetation or debris. *Anopheles punctipennis* was the most numerous Anopheline in the district, and the only domestic one. *A. quadrimaculatus* was found in the larger ponds and natural streams. The cost amounted to about 16s. per head of the population. After the experiment, the incidence of malaria decreased from 16 per cent. to about 4 per cent.

Taylor (H. A.). **Malaria Control through the Application of Anti-mosquito Measures and some of the Results obtained in South-east Arkansas.**—*Southern Med. Jl., Birmingham, Ala.*, xiii, no. 5, May 1920, pp. 339–343.

The drainage and oiling measures adopted covered an area of twelve square miles with a population of 9,980. The operations began on 1st April 1918, and by the end of May mosquitos were almost entirely absent. The malaria rate was reduced about 73 per cent. at a cost of about 3*s*. 6*d*. per head.

In the discussion following this paper, Mr. H. R. Carter pointed out that if development from egg to adult takes sixteen days, there is no need to oil until the larvae are reaching maturity.

Waterston (J.). **Description of the Female of** *Chiastopsylla godfreyi*, **Waterst., with further Notes on the Genus.**—*Trans. Ent. Soc., London,* 1920, pt. 3–5, 21st April 1921, pp. 414–416, 1 fig.

The female of *Chiastopsylla godfreyi*, Waterst., is described from Cape Colony, where it infests various small mammals. A key is given to the fleas of the genus, *Chiastopsylla*, Rothsch.

Marcenac (—). **Dermatose par** *Ixodes ricinus*.—*Recueil Méd. Vét. d'Alfort,* xcvii, no. 2, 30th January 1921, pp. 58–61.

These observations are based on a number of cases of dermatitis in horses that were caused by ticks, *Ixodes ricinus*. In severe cases, numerous cutaneous lesions are produced, which merge into large, hairless, irritable patches that are slow to heal. When horses are obliged to cross infested land they should be protected with a wash consisting of a tepid solution of cresyl, or rubbed down with a sponge dipped in benzine and then wrung out so as to contain only the vapour. Sulphur fumigation is the best curative method ; thirty minutes in the disinfecting chamber rids the animals of all ticks.

Lesne (P.). **La Faune Entomologique des Fosses d'Aisances de la Région Parisienne. Les** *Fannia* **scatophages.**—*Bull. Mus. Natnl. Hist. Nat., Paris,* 1921, no. 1, pp. 53–59.

The following Diptera, among other insects, were found in an examination of cesspools in the Paris region: *Fannia incisurata*, Zett., *F. scalaris*, F., *Tychomyza fusca*, Macq., *Limosina fulvipes*, Meig., *L. minutissima*, Zett., and *Scatopse notata*, L. It was at first thought that these two species of *Fannia* were probably the same with two different types of males, but breeding experiments proved them to be two distinct species.

Surcouf (J. M. R.). **Notes biologiques sur certains Diptères.**—*Bull. Mus. Natnl. Hist. Nat., Paris,* 1921, no. 1, pp. 67–74.

A brief account is given of the bionomics of *Stomoxys calcitrans*, L. During 1920, the first individuals in the vicinity of Paris were noticed between 16th and 21st June. In Brittany, this fly is particularly abundant in August. There are apparently two generations a year, the second being the more important. Among natural enemies of *Stomoxys* are *Nasonia brevicornis*, Ash., *Trombidium muscarum*, and various fungi. Remedial measures include cleansing stables with 1 per cent. cresyl solution and proper disposal of manure.

Séguy (M. E.). **Les Moustiques de France.**—*Bull. Mus. Natnl. Hist. Nat., Paris,* 1921, no. 2, pp. 162–169, 4 figs.

A key is given to the French species of *Culex*. Those dealt with are *C. pipiens*, L., *C. laticinctus*, Edw., *C. hortensis*, Fic., and *C. apicalis*, Adams (*pyrenaicus*, Brolemann).

This final instalment [*cf.* R.A.E., B, viii, 224; ix, 131] contains a table of the species giving their most frequent habitat and method of oviposition. An index to the genera and species is also included.

Serre (P. A.). **Insectes piquants et parasites au Costa-Rica.**—*Bull. Mus. Natnl. Hist. Nat., Paris,* 1921, no. 2, pp. 170–172.

The mosquitos recorded from Costa Rica are: *Aëdes taeniorhynchus, A. angustivittatus, A. dupreei, A. serratus, A. podographicus, A. quadrivittatus, A. argenteus* (*Stegomyia fasciata*), which is the transmitter of yellow fever, *Anopheles neivai, A. albimanus,* which is considered to be the chief transmitter of malaria, *Culex rossi, C. corniger, C. mortificator, C. jubilator, C. proclamator, C. coronator, C. latisquama, C. extricator, C. elevator, C. jenningsi,* and *C. fatigans,* which transmits dengue fever and *Filaria bancrofti* producing elephantiasis.

As a protection against Simuliids, *Trombidium* sp. and *Rhipicephalus sanguineus,* all of which are abundant in Costa Rica, the author used a mixture containing 1 oz. tar oil, fish oil, oil of pennyroyal, oil of citronella, and camphorated brandy, and ½ oz. gaiacol and salol.

Surcouf (J. M. R.). **Revision du Genre** *Pelecorhynchus* **Macquart (Diptères piqueurs de la Famille des Tabanidae).**—*Bull. Mus. Natnl. Hist. Nat., Paris,* 1921, no. 3, pp. 221–224, 1 fig.

The genus *Pelecorhynchus* is revised, and a key is given to *P. claripennis,* Ric., *P. distinctus,* Tayl., *P. eristaloides,* Wlk., *P. fulvus,* Ric., *P. fusconiger,* Wlk., *P. maculipennis,* Macq. (*ornatus,* Schin., *personatus,* Wlk.), *P. nigripennis,* Ric., *P. tillyardi,* Tayl., *P. darwini,* Ric., and *P. vulpes,* Macq. (*aurantiacus,* Ric.). Except for *P. darwini* and *P. vulpes,* which are recorded from Chili, all the species are of Australian origin.

Séguy (E.). **Faune Entomologique des Iles Canaries. Séjour de M. P. Lesne dans la Grande Canarie (1902–1903). ii. Diptères piqueurs.**—*Bull. Mus. Natnl. Hist. Nat., Paris,* 1921, no. 4, pp. 291–295, 2 figs.

The biting Diptera recorded from the Canary Islands are: *Culex pipiens,* L., *C. laticinctus,* Edw., *C. hortensis,* Fic., *Aëdes argenteus,* Poiret, *A. detritus,* Hal., *A. caspius,* Pall. (*punctatus,* Meig.), *Theobaldia annulata,* Schk., *T. longiareolata,* Macq., *Simulium canariense,* sp. n., *S. submorsitans,* sp. n., *S. pseudequinum,* sp. n., *S. obreptans,* Edw., *Lyperosia minuta,* Bezzi, *Stomoxys calcitrans,* L., and *Hippobosca equina,* L.

Bacot (A.). **Wood Tar Oils for the Destruction of Lice** (*Pediculus humanus*) **on Hair-clad Areas.**—*Brit. Med. Jl., London,* no. 3177, 19th November 1921, p. 853.

As the light wood-tar oil previously recommended as a culicifuge [*R.A.E.,* B, vii, 72–74] is no longer obtainable, samples of various proprietary preparations of a similar type were tested for their efficiency in destroying *Pediculus humanus.* Nearly all of them gave equally good results. The oil must be applied liberally so that the lice are completely immersed in the droplets; it should be used neat or diluted with some other oil, and no absorbent material should come in contact with the treated area for an hour if possible. Greased or waxed paper or rubber-surfaced articles should for preference be used

to cover the hair after treatment. The odour of paraffin can be concealed by the addition of a small quantity of an essential oil or other scent, such as oil of mirbane (nitro-benzol) or camphor. The latter has the advantage of allaying skin irritation.

Grassi (B.). **Nuovo Orizzonte nella Lotta antimalarica. (Memoria preliminare.)** [A New Horizon in Anti-malarial Work. (Preliminary Memoir.)]—*Riv. Biologia, Rome,* iii, no. 4, July–August 1921, pp. 421–463.

In the marshy market-gardens at Schito, on the Bay of Naples, there is a biological race of *Anopheles maculipennis* (*claviger*) that lives exclusively on domestic animals. It is only in closed spaces and when driven by hunger that it can be induced to attack man. This dislike for man seems to be to some extent hereditary and to date from a period between 1860 and 1885, when the locality contained a herd of cattle, tended at night by only a few men. The mosquitos thus became accustomed to attack domestic animals only. As a result, malaria has disappeared from Schito, though *A. maculipennis* abounds.

At Massarosa, a similar state of things must have occurred at some period, for malaria disappeared there also. Owing, however, to the relative scarcity of cattle and the abundance of *A. maculipennis,* due to the presence of rice-fields and marshes, a man-attacking race of the mosquito is gradually reappearing, and a slight recrudescence of malaria has been observed in recent years.

It is therefore legitimate to try to combat malaria by using the protection afforded by cattle, but whether this is feasible on a large scale remains to be seen. In tropical countries where cattle are scarce or absent, Anophelines mainly attack man, and this is certainly one of the factors that aggravate the malarial conditions there.

In view of this preference for domestic animals, the measures directed against adult mosquitos may defeat their object, the greater ease with which captures are effected in pigsties and cowsheds as compared with dwellings resulting in a tendency to eliminate the individuals that prefer animals to man. Screening, which has not been much favoured in Italy, thus acquires a great importance, as it tends to encourage the habit of avoiding man.

The fact that *A. maculipennis* occurs in varying and sometimes enormous numbers in districts where malaria has disappeared, and that in some of these places it seldom or never bites, must be an incentive to find a method for rendering it innocuous. The fact that cultivation of an intensive character drives away malaria is explained by the correlated increase in domestic animals. Such animals are not only numerous, but they are usually kept in shelters that are more or less dark, dirty and warm, and therefore attractive to Anophelines. The latter are thus brought to attack animals by preference, and gradually cease to bite man.

Hirst (S.). **Notes on Parasitic Acari. A. On the Presence of a System of Tracheal Tubes in the Families Sarcoptidae and Listrophoridae. B. Note on the two Valid Species of the Genus** *Psoroptes* (*P. natalensis* **and** *P. communis*).—*Jl. Quekett Micros. Club, London,* Ser. 2, xiv, no. 87, November 1921, pp. 229–236, 3 figs.

The contents of this paper are indicated by its title.

Bodkin (G. E.). **Some recent Entomological Surveys bearing on Malarial Incidence in British Guiana.**—*Jl. Bd. Agric. British Guiana, Demerara*, xiv, no. 4, October 1921, pp. 226–229.

Surveys of a number of sugar estates have recently been made with special reference to the breeding-places of Anopheline mosquitos. The methods employed are described. Only *Anopheles tarsimaculatus*, Goeldi, was found, and this appears to be the prevalent species throughout the coast lands of British Guiana. It invariably breeds in shallow, grass-grown drains, well shaded from the direct rays of the sun. The author has only found the larvae in comparatively clear, fresh water. On every estate so far examined, breeding occurs in close proximity to the inhabited portions.

In the Potaro district, which is some distance from the coast, and where malaria is severe, *A. tarsimaculatus* was not found, the predominant Anopheline being *A. argyritarsis*, R.D.

Bodkin (G. E.). **The Mosquitoes of British Guiana.**—*Jl. Bd. Agric. British Guiana, Demerara*, xiv, no. 4, October 1921, pp. 251–261.

This condensed list of 54 mosquitos from British Guiana is practically a revision of previously published ones.

Bodkin (G. E.). **Report on Malarial Mosquitoes in the Potaro District.**—*Jl. Bd. Agric. British Guiana, Demerara*, xiv, no. 4, October 1921, pp. 262–265.

Anopheles argyritarsis, R.D., is the prevalent mosquito in the Potaro district. It breeds in old tins and other receptacles in which, owing to the rainfall, a constant supply of fresh water is available. It was also found breeding in a clear stream much overgrown with grass. Larvae of *Aëdes argenteus*, Poiret, and *Culex fatigans*, Wied. (*quinquefasciatus*, Say) were found in abundance in rain-water containers. Other species recorded include *Sabethoides nitidus*, Theo., *Limatus durhami*, Theo., and *Uranotaenia geometrica*, Theo.

Minett (E. P.). **Agriculture** *versus* **Malaria.**—*Jl. Bd. Agric. British Guiana, Demerara*, xiv, no. 4, October 1921, pp. 289–291.

The value of agriculture and sanitation as means of reducing malaria by destroying the breeding grounds of mosquitos is emphasised. The methods of reclaiming swamps and other land unsuitable for cultivation practised in Egypt and Trinidad are described, and their adoption in British Guiana is urged.

Keilin (D.). **On some Dipterous Larvae infesting the Branchial Chambers of Land-crabs.**—*Ann. & Mag. Nat. Hist., London*, viii, no. 48, December 1921, pp. 601–608, 8 figs.

The two species of Dipterous larvae here recorded were found in the branchial chambers of the land-crabs *Cardiosoma hirtipes*, from the Admiralty Islands, and *Gecarcoidea lalandii*, from Christmas Island, respectively. They probably belong to the Ephydridae or at least to a very closely allied family. It is doubtful whether these larvae are parasitic. They are, to some extent at least, saprophagous, and they

probably feed on the detritus that they find in the branchial chamber of crabs, but they may also feed on the blood or mucus from the gills of the host. They are thought to live in salt or brackish water, their occurrence in the crab being probably purely accidental.

EDWARDS (F. W.). **H. Sauter's Formosan Collections: Culicidae.**—*Ann. & Mag. Nat. Hist., London,* viii, no. 48, December 1921, pp. 629–632.

This list of mosquitos collected in Formosa includes two new species: *Megarhinus manicatus* and *M. aurifluus*. The latter was apparently recorded by Theobald in 1901 as *M. splendens*, Wied. Examination of the type male of *M. splendens*, Wied., proves it to be identical with *M. regius*, Tennent.

SELLA (M.). *Anopheles claviger*: **Observations on its Distribution in Relation to Domestic Animals, and its Movements during Hibernation.**—*Internat. Jl. Public Health, Geneva,* ii, no. 6, November–December 1921, pp. 605–616, 1 table, 4 figs.

The observations here described were made in the course of an anti-malaria campaign in a village in the Province of Caceres, Spain. Owing to the mild climate the hibernation of *Anopheles maculipennis* (*claviger*) is only partial, but the hibernating individuals have only a small range of flight and are seldom found at any great distance from the point selected for passing the winter. Freshly emerged adults do not appear between the end of November and the end of March, and although larvae may occasionally be found as late as January, they generally die without completing their development.

Oviposition is resumed after the middle of February. The first generation hatches early in April, causing a rapid increase of mosquitos during the second half of that month. These mosquitos were completely held up by the outlying stables of the village, and practically none reached the houses. In June, however, they became very numerous in houses, and this increase did not entirely coincide with the removal of the animals. The invasion of houses by Anophelines is not only influenced by the number of domestic animals in the neighbourhood, but also by the season and the resulting changes in the atmosphere of houses and stables. Mosquitos probably avoid human dwellings because of the low temperature of the unheated rooms and the dryness of those artifically heated. The conditions that make them prefer stables to houses in the winter, persist throughout an appreciable part of the spring, until about the time the second generation of adults is produced.

This, coupled with the fact that *Anopheles maculipennis* does not usually bite during winter and spring in the open air, would explain the delay in the appearance of new infections after the mosquitos appear. The rarity of infections in the spring is thus due to the interruption of the relations of the mosquitos with man rather than to the inhibited development of parasites as a result of low temperatures. When no winter campaign against Anophelines is undertaken, it may be worth while to omit the oiling directed against the first larvae, and not begin operations till the end of April. Before this can be decided, however, the life of the adults of this generation will have to be determined, to ascertain whether they may live long enough to contribute later to infections.

LEGENDRE (J.). **Anophelisme et Cuniculiculture.**—*Bull. Agric. Alg.-Tunisie-Maroc., Algiers*, 2nd Ser., xxvii, no. 10, October 1921, pp. 159–160.

The information contained in this paper has been noticed elsewhere [*R.A.E.*, B, x, 3].

ATKINS (W. R. G.). **Note on the Chemotropism of the House Fly.**—*Ann. App. Biol., Cambridge*, viii, no. 3–4, November 1921, pp. 216–217.

As confirming the experiences of Imms and Husain [*R. A.E.*, A, viii, 327] and of Speyer [*R. A.E.*, B, viii, 215] the author records observations made mainly at Aboukir, Northern Egypt, between 1916 and 1919, in the course of experiments in fly destruction. Dilute formalin with a little bread in it, placed near a window in the morning, when the flies drink, proved very effective. A dome-shaped glass vessel with a rim turned up inwards, made an excellent trap when supported on three legs, the trough formed by the rim being filled with beer. Dishes containing about 1 per cent. formalin and a little crude alcohol were very effective. The amyl alcohol, together with the fusel oil constituents, doubtless attracted the flies. The attractive qualities of iso-amyl acetate and other esters of these alcohols, recorded by Speyer, are borne out by the powerful attraction for flies of the aeroplane doping sheds. The dope consists of acetyl cellulose dissolved in a mixture containing acetone, methyl-acetate, methyl alcohol, ethyl alcohol and benzene as solvents or diluents and benzyl alcohol as a residual solvent. It is probable that the methyl acetate is the attraction, and possibly also the benzyl alcohol, though this is unlikely. Far greater than the attraction of dope, however, was that of the nitro-cellulose varnish, in which the main solvent was iso-amyl acetate at first, and later on, *n*-butyl acetate. The thousands of flies attracted from a neighbouring village by the strong odour of butyl acetate afforded an example of chemotropism on a very large scale. Surplus supplies of *n*-butyl alcohol are available, so that its use in quantities as the acetate in a campaign against flies should be possible. The ester is volatile and boils at 125° C. [257° F.], so that it would have to be replenished at intervals. Iso-amyl acetate is slightly less volatile and boils at 139° C. [282° F.].

FERNALD (H. T.). **Applied Entomology. An Introductory Text-book of Insects in their Relations to Man.** —*New York & London*. McGraw Hill Book Co. Inc., 1921, xiv+386 pp., 388 figs. Price $3·50 or 21*s*.

After deploring the chaotic condition of the teaching of Entomology in the United States, and remarking on the diverse opinions of authorities (to which he adds his own) as to subject matter, methods of presentation, or even the line of training, the author offers this work as " a classroom text for an introductory course."

Although the major portion of this book is of agricultural interest, brief summaries of our present knowledge regarding the insects transmitting disease, those attacking domestic animals, and household pests, are given under the groups concerned.

The Arachnida are not included, neither are there any references to literature, presumably on account of the elementary nature of the

book. The sources, however, of many of the numerous excellent illustrations are given ; those that are not original have been selected from well-known manuals, and this careful selection enhances the value of this up-to-date, but not too technical, entomological primer. Unfortunately the index does not include the insects that are illustrated, but not mentioned in the text.

MARTINI (E.). **Zur Bionomie unserer Stechmücken.** [A Contribution to the Bionomics of German Mosquitos.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic*, xxv, no. 11, November 1921, pp. 341–347.

The results of a series of breeding experiments with mosquitos fed on "Piscidin" are tabulated. In the case of *Anopheles bifurcatus*, *A. maculipennis* and *Theobaldia annulata* the duration of the egg-stage, of each of the four larval stages and of the pupal stage is shown. For *A. bifurcatus* the total period ranged from 16½ days to 19 days at 24°–26° C. [75°–79° F.]; at 20°–22° C. [68°–72° F.] from 17½ to 30 days were required. For *A. maculipennis* at 24°–27° C. [75°–81° F.] the time was 13½–16 days, these figures including an egg stage of doubtful duration (? 2 days) ; at 20°–22°C. [68°–72° F.] 16–20 days ; and at 16°–19° C. [61°–66° F.] 27–35½ days. For *T. annulata* at 24°–27° C. [75°–81° F.] the time was 16½ days ; at 20°–23° C. [68°–73° F.] 17–19 days ; at 16°–20° C. [61°–68° F.] 21–26 days. The course of development is generally more regular at the higher temperatures. In all cases the fourth larval stage lasts longer than the other three. Males develop more quickly than females.

It is not known whether the minimum time of development is shown in these tables. Feeding was done three times a day, but as no traces of food were seen in the morning it is possible that the quantity was not sufficient, thereby prolonging development by one day. In the case of *T. annulata* it is certain that the time could be reduced by a different method of feeding. Higher temperatures did not prove successful. The figures for *T. annulata* at 27° C. [81° F.] show that constant temperatures as high as this are unsatisfactory (in further experiments it was also difficult to obtain a pupa and adult from a fourth-stage larva of *Aëdes rusticus* (*diversus*) at this temperature). At a lasting temperature of 30° C. [86° F.] it was difficult to breed *A. maculipennis*, and the few adults obtained showed a slight prolongation of development. For this species, therefore, 27°–28° C. [about 81° F.] may perhaps be the optimum as far as constant temperatures are concerned.

These results agree well with those of Howard, Dyar and Knab, Ziemann, and Sella [*R. A. E.*, B, viii, 222]. It is possible that the smaller Anophelines can develop somewhat more rapidly.

The eggs of *Aëdes nigripes* usually hatch 6–8 hours after wetting. In summer at a temperature of 21°–24° C. [70°–75° F.] the larval stage lasts about eight days ; the pupal stage requires only about three days. These periods are probably shorter in nature, and as the adults can emerge from the pupae on damp ground, it is sufficient for a collection of water to remain for about eight days to give rise to a brood of this species.

In testing the resistance of Anopheline larvae to cold, the eggs of *A. maculipennis* were found to remain uninjured on damp (not wet) frozen earth for several days. It is, therefore, possible that Anophelines that have matured their eggs indoors in winter may oviposit outdoors

on warm days, and that the eggs can survive the winter even if the water in which they are laid should dry up temporarily. These observations are remarkable in that *A. maculipennis* is not believed to hibernate in the egg-stage.

Wille (J.). **Biologie und Bekämpfung der deutschen Schabe** (*Phyllodromia germanica*, **L.**) [The Biology and Control of the German Cockroach, *Blatella germanica*.]—*Monographien zur angew. Entomologie*, no. 5, Beiheft no. 1 to *Zeitschr. angew. Ent., Berlin*, vii, 1920, 140 pp., 53 figs., 2 plates. [Received 6th December 1921.]

This monograph deals minutely with the breeding, classification, morphology and life-history of *Blatella* (*Phyllodromia*) *germanica*, L. The influence of external stimuli on this species and the technique employed in investigation are also described in detail. The remedial measures described are applicable not only to this cockroach, but also to *Blatta* (*Periplaneta*) *orientalis*, and *Periplaneta americana*. These species devour a greater quantity and variety of food and are chiefly responsible for injury on a large scale in warehouses.

B. germanica is now a cosmopolitan species, chiefly found indoors, but also occurring in forests. Its original home appears to be the old eastern centres of civilisation. It sometimes migrates in numbers and thus invades new buildings under cover of night. Owing to its larger number of eggs and its shorter developmental period it tends to displace other cockroaches. It is chiefly found in rooms with a temperature of about 20° C. [68° F.] and some degree of moisture. The period of greatest activity in winter occurs between 5 and 7.30 p.m. It was found that a first-stage larva can pass through a crack ½ mm. high and 1 mm. wide.

Parthenogenesis does not occur. At a temperature of 22° C. [72° F.] the female carries the egg-cases for about 24 days until the larvae hatch. The larval period lasts 172 days on an average at this temperature, but at higher ones it may be as short as 75 days.

Liquids present an insurmountable barrier to *P. germanica*, which never voluntarily enters water. Complete submersion for 2½–3½ hours causes death. Preventive measures are of little value against cockroaches. Poison-baits are unsatisfactory in so far as no food is known that is irresistibly attractive. Borax, salicylic acid, a mixture of two parts borax and one of salicylic acid, and sodium silicofluoride, are often employed indoors. Arsenicals are more efficacious but little used. A dose of two milligrammes of arsenic trioxide (white arsenic) proves fatal in two days ; a stronger one does not kill more quickly. Fumigation with hydrocyanic acid gas is considered to be the most effective measure and it will also destroy any bugs, fleas, etc., that may be present. *B. germanica* is very susceptible to this gas, though *B. orientalis* and *P. americana* are slightly less so. A strength of 0·124 volume per cent. kills the adult and all the larval stages in two hours. In practice fumigation lasts more than two hours, and a minimum dose of 1 volume per cent. is used. The egg-cases of *B. germanica* are readily destroyed, but those of the other species, which are not carried by the female, are more resistant, though 24 hours' exposure to 1 volume per cent. destroys them. Experiments in biological control did not give satisfactory results. A parasite, *Brachygaster minutus*, Ol., was observed, but its efficiency is doubtful.

WALCH (E.) & WALCH-SORGDRAGER (B.). **A malarial Epidemic caused by** *M. sinensis* [*Anopheles hyrcanus*].—*Meded. Burg. Geneesk. Dienst Ned.-Indië, Batavia,* 1921, no. 1, pp. 2–47, 1 map, 1 chart, 10 tables. (Also in Dutch.)

At the end of 1919 a malaria epidemic of a mild character and without fatal cases began on a coconut estate on the east coast of Sumatra about three miles from the sea. *Anopheles hyrcanus* (*sinensis*) was the chief carrier of both benign and malignant tertian, *A. ludlowi* and *A.* (*Cellia*) *kochi* being also concerned.

The mosquitos dissected were: *A. ludlowi*, 58, of which 10 (17·5 per cent.) were infected; *A. hyrcanus*, 7,257, of which 107 (1·5 per cent.) were infected; *A. kochi*, 79, of which 9 (11·5 per cent.) were infected; *A. minimus* var. *aconitus*, 43, of which 1 (2 per cent.) was infected; and *A. punctulatus*, 1, which was infected. The infection of mosquitos of different ages (as shown by the number and size of the ova) was investigated from January to March. Old individuals predominated. Mosquitos without ova were almost free from infection (1 in 318).

A. hyrcanus and *A. barbirostris* were abundant in drains. A few *A. vagus* (*indefinitus*) were found, and one *A. hyrcanus* was taken from salt-water quite close to the sea. When *A. ludlowi* appeared in numbers in June 1920, its breeding-places were found near the village. No breeding-places of *A. kochi* were found. Though the larvae of *A. barbirostris* almost equalled *A. hyrcanus* in numbers, only 15 adults of the former were captured to about 12,000 of the latter.

No infection of *A. hyrcanus* on such an extensive scale has been previously observed, and no epidemic has been recorded with this Anopheline as the chief carrier. Swellengrebel and Schüffner have, however, pointed out that non-dangerous carriers may become important by keeping up an epidemic caused by a dangerous species, or, as apparently in this case, by occurring in very large numbers.

The cysts in *A. hyrcanus* contained all kinds of pigment, including that characteristic of benign tertian. Its absence in *A. kochi* seems to show that this species only carries malignant tertian. This pigment was also absent in *A. ludlowi*.

The general employment of quinine gave good results, and drainage was also undertaken. The building of buffalo sheds proved unsuccessful. A few oiling experiments with a mixture of equal parts residue and solar oil were effective. Large scale oiling was planned, but not carried out owing to the decrease of malaria and mosquitos in March; the need for it became more urgent with the appearance of *A. ludlowi* in June. About 13,000 adult mosquitos were captured, including over 100 infected individuals.

SCHÜFFNER (W.) & HYLKEMA (B.). **Die Malaria-Epidemie in Naras im Jahre 1918.** [The Malaria Epidemic at Naras in 1918.]—*Meded. Burg. Geneesk. Dienst Ned.-Indië, Batavia,* 1921, no. 1, pp. 48–91, 4 figs., 1 map, 2 charts. (Also in Dutch.)

A severe epidemic of malaria was reported in August 1918 from a village of 3,600 inhabitants on the west coast of Sumatra. A tidal lagoon contained the only breeding-places found of *Anopheles ludlowi*, the carrier responsible for the outbreak. *A. barbirostris* and *A. hyrcanus* (*sinensis*) were taken from a pool of brackish water; like *A. umbrosus*,

these two species are not repelled by a high salt-content. *A. kochi*, *A. punctulatus*, *A. fuliginosus*, *A. karwari*, *A. albotaeniatus*, and *A. indefinitus* were the other species found.

The distribution of benign tertian malaria was independent of the breeding-centre of *A. ludlowi*, while that of malignant tertian coincided with it. Cases of quartan malaria were rare.

Large numbers of Anophelines were captured in houses at the beginning of the epidemic, but only a few by the end of December. Many were taken, however, at this time beneath houses and on cattle. *A. ludlowi* predominated at first indoors, but later it disappeared entirely from indoors. *A. karwari* was found, even indoors, in this flat, coastal district at least twelve miles distant from the hills.

Of 66 dissections of *A. ludlowi*, 4 (6 per cent.) had cysts in the stomach wall; the other 567 dissections, chiefly of *A. hyrcanus*, were all negative. This percentage of naturally infected *A. ludlowi* is small compared with the number of infectious gamete carriers, it having been calculated that 23 per cent. of the population had sufficient crescents to infect mosquitos.

An infection of 6 per cent. of *A. ludlowi* at the beginning of the epidemic would have been inadequate to develop the latter to its enormous extent. It is, therefore, supposed that at that time the individuals of *A. ludlowi* were longer lived, so that the percentage of infected ones rapidly increased with the percentage of gamete carriers. Later on, owing to changed conditions (fewer *A. ludlowi*, more enemies, and therefore shorter life), the infection index decreased although the number of gamete carriers remained considerable. The epidemic thus continues until quinine treatment or spontaneous recoveries reduce the number of gamete carriers and the chances of infection of the remaining mosquitos become negligible. The low infection index found need not therefore prevent *A. ludlowi* from being the exclusive cause of the severe epidemic. The large increase of *A. ludlowi* assumed to have occurred at the beginning of the epidemic agrees with statements to this effect by the inhabitants.

Sergent (Ed. & Et.), Parrot (L.), Donatien (A.) & Béguet (M.). **Transmission du Clou de Biskra par le Phlébotome** (*Phlebotomus papatasi* **Scop.**).—*C.R. Hebdom. Acad. Sci., Paris*, clxxiii, no. 21, 21st November 1921, pp. 1030–1032.

Examples of *Phlebotomus papatasii*, Scop., captured at Biskra were transferred to Algiers for experiments in connection with the transmission of oriental sore. In all, 2,346 individuals were thus transported, including 2,282 *P. papatasii*, 8 *P. perniciosus* and 56 *P. minutus* var. *africanus*. Only 559 were, however, fit for experimental work, and as they refused to bite, an extract of their bodies was made and applied to a scarified portion of the fore arm. After three months' incubation the typical lesion containing *Leishmania tropica* appeared at the site of inoculation.

This shows that *P. papatasii* originating in an endemic focus of oriental sore harbours a virus that, from whatever source it may be obtained, produces cutaneous leishmaniases in man, the clinical and parasitological aspects of which resemble oriental sore.

Bergmann (A.). **Om renens oestrider.** [On the Bot-flies of the Reindeer.]—*Ent. Tidskrift, Stockholm,* xxxviii, 1917, pp. 1–32, 113–146, 26 plates.

After an introductory description of the adults and full-grown larvae of *Oedemagena tarandi,* L., and of *Cephenomyia trompe,* L., the author gives a detailed account of the egg, the egg-laying habits, the three different larval stages and the pupa of *O. tarandi.* The behaviour of reindeer when attacked by this fly, and the abscesses caused by its larvae are also described.

The eggs are attached to the hairs and are often placed in rows of 6–10. Oviposition takes place from the middle of July to the beginning of September, at a period when the winter hairs of the reindeer are not completely shed. The female in ovipositing sits on the winter hairs and with the help of its long ovipositor places the eggs on the new and shorter summer hairs. Examination of a reindeer calf disclosed the existence of 329 eggs on it, distributed on all parts of the body with the exception of the head, the middle of the back, the chest and the belly. The number of eggs laid by a single female was ascertained by dissection to be nearly 500, and this represents the minimum number, as the dissected females may already have deposited some eggs. The females seem to prefer white hairs, white animals being invariably more attacked than others.

Reindeer are very sensitive to the attacks of these bot-flies, becoming very excited when the flies alight on them and wandering about in a restless manner from 7 a.m. to 8 p.m., when the flies are on the wing.

An examination of reindeer calves in the autumn showed that the young larvae enter the surface of the skin, and at the end of the first stage, when they have attained a length of 7–9 mm., penetrate the skin, where an opening appears, 0·5 mm. in diameter. The warbles are chiefly to be found in the flanks and hind quarters. No animal was ever found entirely free from them except when it had been kept in a zoological garden over a year. The smallest number recorded was 60, and the greatest, 318. From the middle of May the larvae drop to the ground in order to pupate, hiding in the moss. The pupal stage lasts 27 days on an average.

Cephenomyia trompe is viviparous, and the young larvae of the first stage are found in the nostrils ; later on they enter and penetrate the nasal sinuses. Dissected females contained up to 580 larvae. The larvae cause inflammation, and sometimes wander into the lungs of the host, causing its death. When full-grown, the larvae cause violent sneezing in the animal and are thus ejected ; this takes place from the middle of May, the pupal stage lasting about 19 days.

The economic importance of these flies is very great, nearly every reindeer being more or less infested by them. As above mentioned, *Cephenomyia trompe* may occasionally cause the death of its host, and both insects cause great suffering to the animals and by continually disturbing them when grazing, prevent their growing fat. Moreover, the hides are much damaged, skins of reindeer killed from February to July having very little value, which is one of the reasons why the animals are killed in late autumn.

Of the two pests, *Cephenomyia* is the more difficult to control, owing to the position in which the larvae occur. The author suggests that capturing the adults with nets when they hover round the herds would be useful, if the children of the Laplanders could be educated

in this method. In the case of *O. tarandi*, a better method is to kill the larvae; this can be done by rubbing tar on the warbles, and thus suffocating them.

HATORI (J.). [**"Tsutsugamushi" Disease in Formosa (5th communication).**]—*Taiwan Igakkai Zasshi* [Jl. of Formosa Med. Soc.], no. 209, 28th March 1920, pp. 317–352. (Abstract in *Trop. Dis. Bull., London*, xvi, no. 6, 15th December 1920, pp. 416–417.)

A mite, the larva of which cannot be fed on the blood of man, monkey and mouse, but is a parasite of a bird, *Centropus javanicus*, is referred to the author's *Trombidium* (*Trombicula*) *pseudo-akamushi*, which is distinct from though closely allied to *T. mediocris*, Berl.

Two new avian mites are described: *Trombicula* (?) *gallinarum*, of which only the larva is known and which is chiefly parasitic on chickens, but also occurs on *Caprimulgus monticola* and *Corvus macrorhynchus*; and *Trombicula corvi*, from a larva found on *Corvus macrorhynchus*.

In the districts where tsutsugamushi disease is known to occur, *T. akamushi* has been found on various mice, rats and shrews. Dogs and cats are also attacked, and the buffalo carries this mite. Bird hosts include chickens, *Phasianus formosanus* and *Turnix taigoon*.

KAWAMURA (R.) & YAMAGUCHI (M.). **Ueber die Tsutsugamushi-Krankheit in Formosa, zugleich eine vergleichende Studie derselben mit der in Nordjapan.** [Notes on the Tsutsugamushi Disease in Formosa, and also a Comparison of it with that found in North Japan.]—*Kitasato Arch. Exptl. Med., Tokyo*, iv, no. 3, 1921, pp. 169–206, 8 plates, 5 charts, 5 tables.

The organism causing tsutsugamushi disease appears to be the same in Formosa as in Japan, but possesses less virulence in the former island, fatal cases being rare. The mite transmitting it, *Trombidium* (*Trombicula*) *akamushi*, Brumpt, was taken from *Mus alexandrinus*, *M. decumanus*, *Apodemus semotus*, *Apodemus* sp., dogs, cats, monkeys, buffalos, fowls, and quails. In many districts the mites were found in the earth. Morphological notes and figures are given on *T. akamushi* and on allied species [*see* preceding paper and *R. A. E.*, B, viii, 37].

SCOTT (J. W.). **Parasitology Department.**—*30th Ann. Rept. Wyoming Agric. Expt. Sta., 1919–1920, Laramie*, 1920, pp. 133–138. [Received 9th December 1921.]

As *Tabanus septentrionalis* is capable of transmitting swamp fever, experiments in injecting extracts of the bodies of these flies were made to determine if they contained a toxin capable of producing a similar disease, but the results were negative. Two apparently spontaneous cases of swamp fever occurred amongst experimental horses that had been passed as sound when bought, perhaps showing that it is impossible to detect chronic cases by ordinary means. No horses should be bought from ranches where fever has occurred in recent years, and diseased animals should be isolated. Experiments proving that the virus of swamp fever occurs in the nasal secretion of infected horses are described.

Murray (W. A.). **Note on Relation between Tsetse-fly (*Glossina morsitans*) and Game in the Proclaimed Area, Nyasaland.**—*Trans. R. Soc. Trop. Med. & Hyg., London,* xv, no. 4, 20th October 1921, pp. 118–121, 1 map.

Tsetse-flies are widely distributed over Nyasaland, but are chiefly found in the narrow forested belt on the western shores of Lake Nyasa, *Glossina morsitans* being the most important species.

In this area in 1896, rinderpest almost exterminated the cattle and game, and the flies were reduced in numbers to a corresponding extent. After 1904, the game increased and scattered over the greater part of the area, and the fly spread concurrently, with the result that many domestic animals died of trypanosomiasis. *Trypanosoma pecorum* was the organism concerned in all cases examined by the author. These observations only apply to the low-lying parts of the area; above an altitude of 3,000 feet, fly was rarely found, although game was abundant.

Murray (W. A.). **History of the Introduction and Spread of Human Trypanosomiasis (Sleeping Sickness) in British Nyasaland in 1908 and following Years.**—*Trans. R. Soc. Trop. Med. & Hyg., London,* xv, no. 4, 20th October 1921, pp. 121–128, 1 map.

A historical survey of sleeping sickness in Nyasaland is reviewed as evidence in support of the author's opinion that human trypanosomiasis did not exist there prior to 1907–08, but was introduced at that time from Lake Tanganyika or North-east Rhodesia or both.

It appears that *Trypanosoma rhodesiense* was most virulent and spread very rapidly immediately after its first introduction, but has since been much reduced after many passages through the three hosts concerned—man, game and fly. The author assumes that its original source was *T. gambiense* from the north, and by some unknown transition the change of vector from *Glossina palpalis* to *G. morsitans* has resulted in a different strain of trypanosomiasis, causing a more virulent form of disease.

Connal (A.) & Connal (S. L. M.). **A Preliminary Note on the Development of *Loa loa* (Guyot) in *Chrysops silacea* (Austen).**—*Trans. R. Soc. Trop. Med. & Hyg., London,* xv, no. 4, 20th October 1921, pp. 131–134.

Investigations made near Lagos from May to July 1921, as to the possibility of *Chrysops* being the carrier of *Filaria* (*Loa*) *loa* are here described. Of the five natives selected as the source of the infecting feed, three were chosen because the number of embryos in their blood was high, and the other two because the number was small.

Within six hours of the infecting feed the majority of the embryos reached the abdominal muscles of the fly, the remainder proceeding to the thorax and head. In a heavy infection, young filariae may be found in these situations in 24 hours. The embryos do not all develop with equal rapidity. In 5–6 days, young filariae are seen coiled up in the muscles. No stages where motion had entirely ceased were observed as is described in the case of *Filaria bancrofti*. The final stage is reached in 10–12 days, when the filariae begin to travel towards the head and accumulate at the root of the proboscis and in the labium. They gain exit by the labella.

In attempts to infect various animals (guinea-pigs, rabbits and a monkey), it was noted that a fly heavily infected showed signs of irritation whilst feeding, withdrawing and inserting its proboscis several times. Finally it jerks out the proboscis, and rapidly milks it with the fore-legs, flicking the minute masses of filariae some little distance away, and distributing others by moving its position. In slight infections it is difficult to detect the issue of the worms. When the filariae have reached the skin of the mammalian host, they are just visible. Their movements are extremely rapid, and in less than sixty seconds they have completely disappeared beneath the epidermis.

No flies survived more than 14 days after being experimentally infected, but of three flies that had a naturally acquired infection before the experimental one, none lived longer than one day after filariae were observed to issue from its proboscis. The flies used in the experiments were caught in the bush, and only allowed to feed when their stomachs were empty. Of 225 flies examined as a control, just over 3·5 per cent. were found naturally infected. Of 153 experimentally infected flies examined, just over 3 per cent. acquired natural infection first. In every case examined the experimental infection was successful.

Eggs and larvae of *Chrysops* were found in the mud of a swamp, but no pupae were discovered. *Chrysops silacea* was the most abundant, *C. dimidiata* was fairly common, and *C. longicornis* rare. The last-named was not used in the experiments. The flies are most troublesome in the late morning and early evening.

Schuurmans Stekhoven Jr. (J. H.). **Zur Biologie der Krätzmilben.** [On the Biology of the Itch-mites.]—*Verh. Kon. Akad. Wet. Amsterdam* (2), xxi, no. 2, pp. 1–152, 20 plates. (Abstract in *Vakblad v. Biologen, Helder*, iii, no. 4, December 1921, pp. 57–59.)

The biology of the itch-mite or mites occurring on *Mus rattus*, L., is dealt with in this work, which is written in German. Very little has been published on the subject since 1880. The information given includes notes on the hatching of the larva and on the nymphs. Two nymphal stages occur between the larva and the male adult, and three between the larva and the female adult. The author agrees with previous observers that the male pairs with the female when the latter is in the last nymphal stage.

Dr. Oudemans, the writer of the Dutch abstract, discusses at length the synonymy of the mites infesting mice, rats and other small mammals. If the mite of *Mus rattus* is identical with that infesting *M. decumanus*, the correct name for it is *Notoedres muris*, Megn.

Penna (J.) & Barbieri (A.). **El Paludismo y su Profilaxis en la Argentina.** [Malaria and its Prophylaxis in Argentina.]—*Buenos Aires*, Ministerio del Interior, Dept. Nacional de Hygiene, 1916, vii+390 pp., 2 plates, 53 figs, 5 maps, 4 charts.

This book records the methodical campaign undertaken by the Argentine Government against malaria.

Of the Argentine Anophelines, *Anopheles pseudopunctipennis*, Theo., is the most abundant in the malarial zone. It occurs throughout the northern provinces and is followed in order of abundance by *A. albitarsis*, Arrib. *A. annulipalpis*, Arrib., probably inhabits only the banks of the Rio de la Plata and the region south of Buenos Aires. *A.* (*Cellia*) *albimanus*, Wied., is infrequently met with in the Republic.

Many other species of Anophelines occur in Brazil, and probably extend into neighbouring countries. The malarial northern provinces of Argentina have a fauna and flora similar to those of Brazil, and a high temperature in summer and autumn, so that their infestation by at least some of the Brazilian species is certain.

RODHAIN (J.). **Remarques au Sujet de la Biologie de l'***Ornithodorus moubata.—Ann. Soc. Belge Méd. Trop., Brussels,* i, no. 1, November 1920, pp. 133–138.

Further evidence is adduced confirming the author's previous statement that the spread of *Ornithodorus moubata* is hindered by dense humid forests [*R.A.E.*, B, vii, 151], and this tick has not been found in the forest regions of the Lower Congo.

It can thrive in all stages and produce fertile eggs when fed on the blood of cold-blooded vertebrates such as snakes and geckos. This fact was ascertained experimentally, but the ease with which the ticks adapted themselves to these hosts seems to indicate that such infestations may occur in nature.

MCCOY (G. W.). **The Problem of Plague in the United States.**—*Amer. Jl. Hyg., Baltimore, Md.*, i, no. 2, March 1921, pp. 182–191.

The first cases of plague in the United States were recognised in San Francisco in 1900. The experience gained since then shows that even in those communities where very high sanitary standards do not exist the disease does not develop into a disastrous epidemic such as was feared might follow its introduction. The deaths have nowhere been sufficiently numerous to be reflected seriously in the mortality statistics.

Plague has been found naturally in the following rats and mice in cities in the United States : *Mus norvegicus, M. rattus, M. alexandrinus* and *M. musculus*. *M. norvegicus* predominates in the country as a whole, but in southern ports, *M. rattus* and *M. alexandrinus* form a large percentage of the rodent population. All three are concerned in transmission, but their relative importance cannot be stated. Among rural species of rodents or among those usually regarded as city dwellers, but sometimes living under rural conditions, natural infection occurs in *Citellus beechyi* (ground squirrel) in California, in *Mus rattus* in Hawaii, and in one species of *Neotoma* (wood rat) and in a field rodent in Louisiana. Only about seventeen human cases traceable to squirrels have been found since the squirrel origin of plague has been established. The serious aspect of squirrel plague lies in the danger of transmission to urban rats, but as squirrel plague exists in an area at least 150 miles long by 50 miles wide, it is a serious question whether its eradication is justified economically.

As regards insect carriers, epidemiological data seem to justify serious attention being given to fleas only. Surveys in San Francisco show *Ceratophyllus fasciatus* to be the common rat flea, with *Xenopsylla* (*Loemopsylla*) *cheopis* forming only a small percentage of the total ; in southern ports the proportions are reversed. Both attack man, and it has been experimentally proved that either may be a medium for infection. The common mouse flea, *Ctenophthalmus musculi*, stands alone among common rodent fleas in its refusal to attack man. The common squirrel flea, *Ceratophyllus acutus*, can carry plague among squirrels and from the latter to other rodents.

FINDLAY (W. F.). **Cheese-mite Itch and Conjunctivitis. A "Minor Horror" of the Great War.**—*N.Z. Med. Jl., Wellington,* xx, no. 96, April 1921, pp. 146–150.

Itch due to cheese-mites occurred in New Zealand prior to 1914, but was not common. It appeared in several cheese stores in the Dominion during the war, owing to the prolonged storage of cheese. The mite concerned in the cases of conjunctivitis and itch here dealt with was *Tyroglyphus longior,* Gerv., the life-history of which is briefly noted. The mites were not troublesome if a constant temperature of 35° F. was maintained in the store, though they were not killed. Fumigation with carbon bisulphide, 13 lb. to 5,000 cu. ft., ensured freedom from them for six months. The best method is to fumigate thoroughly a shed or dairy between the seasons when cheese is in store. All corners, ledges and woodwork should be painted with 5 per cent. carbolic.

MAGATH (T. B.). *Dermatobia hominis.*—*Arch. Dermat & Syph., Chicago, Ill.,* ii, no. 6, December 1920, pp. 716–721, 4 figs. (Abstract in *Trop. Dis. Bull., London,* xviii, no. 1, 15th July 1921, p. 25.)

A summary is given of some previously recorded cases of attacks by this fly, with a description and figures of it, the object of the paper being to anticipate the possible spread of *Dermatobia* beyond its present area.

KUBO (Kametarō). [**Common Species of Flies in Houses in Manchuria.**] —*Tokyo Iji Shinshi* [Tokyo Med. News], no. 2180, 5th June 1920, pp. 1085–1087. (Abstract in *Trop. Dis. Bull., London,* xviii, no. 1, 15th July 1921, p. 22.)

The following flies were collected during September and October in food shops in the town of Eiko, Manchuria :—*Musca domestica* (8,437), *Muscina stabulans* (6), *Fannia canicularis* (11), *F. scalaris* (1), *Lucilia caesar* (13), *Calliphora lata* (2), *C. erythrocephala* (2), and *Sarcophaga carnaria* (1). *M. domestica* thus formed 98·58 per cent of the total.

TAKEDA (Saburo). [**A Case of Myiasis.**]—*Tokyo Iji Shinshi* [Tokyo Med. News], no. 2190, 14th August 1920, pp. 1531–1535. (Abstract in *Trop. Dis. Bull., London,* xviii, no. 1, 15th July 1921, p. 26.)

This case of intestinal myiasis reported from Seoul, Korea, was due to the larvae of *Muscina stabulans.*

NÄSLUND (C.). **Ett Försök att systematiskt Bekämpa Fläckfeber och Recurrens i Östra Delen av Polen.** [An Attempt systematically to combat Typhus and Recurrent Fever in the Eastern Part of Poland.]—*Hygiea,* lxxxii, p. 845. (Abstract in *Sanit. Supplements, Trop. Dis. Bull., London,* no. 2, 30th June 1921, pp. 107–108.)

The Swedish Red Cross Expedition to Poland in 1920 worked in Minsk and its surroundings from March to May. It was originally intended to destroy lice by the use of both heat and hydrocyanic acid gas, but eventually heat was dispensed with. For producing hydrocyanic acid gas at a concentration of 1 volume per cent. in 1 cubic

metre of air, the best quantities were found to be sodium cyanide 30 gm., sulphuric acid 40 cc., and water 40–80 cc., but these vary with the quality of the cyanide. About 10 per cent. of the theoretical amount of HCN remains in the generating apparatus. Lice and their eggs, placed in various parts of houses in test-tubes lightly plugged with cotton wool, were used as indicators. The houses were divided into classes according to the extent that they could be effectively closed for fumigation, the gas used varying from ½ volume per cent. for 8–10 hours to 2 volumes per cent. for 3–6 hours. Where fumigation was impracticable, all furniture, etc., was removed and disinfected, the floor, walls, etc., being treated with a 5 per cent. solution of creosote soap. The results were such as to demonstrate the efficacy of these methods.

Van Dine (D. L.). **The Destruction of *Anopheles* in screened Dwellings.** —*Southern Med. Jl., Birmingham, Ala.*, xiv, no. 4, April 1921, pp. 289–294.

The figures of the number of female *Anopheles quadrimaculatus* captured within screened houses at Mound, Louisiana, are given for a period of six years. A total of 578 was taken in 109 collections. The conclusion reached is that under the conditions of this region, screening does not give complete protection and that measures are required against Anophelines that succeed in entering. Burning a few ounces of pyrethrum in a screened house was found to drive the mosquitos to the screens, where capture is easy.

Parham (J. C.). **Detection of Mosquito Larvae.**—*U.S. Naval Med. Bull., Washington, D.C.*, xv, no. 2, April 1921, p. 386.

The value of a ladle in searching for mosquito larvae is enhanced by another simple device in the form of a small hand-mirror. This is useful in sunshine for searching for larvae in rain barrels, cisterns, etc., as well as along edges of pools and in water-saturated grass-lands. Larvae either at the surface or in deeper water are instantly detected in the sunlight reflected on the surface of the water. An inspector equipped with mirror and ladle can cover an area that would require four inspectors not so equipped.

Puntoni (L.). **Epidemia di Acariasi del Grano** (da *Pediculoides ventricosus.*) [An Epidemic of Grain Acariasis due to *P. ventricosus.*] —*Il Policlinico, Rome,* xxvii, no. 45, 8th November 1920, pp. 1273–1275.

Pantaleoni (P.). **Vasta Epidemia di Acariasi da Grano in Romagna.** [A big Epidemic of Grain Acariasis in the Roman Region.]—*Ibidem,* p. 1275.

Descriptions are given of two epidemics of dermatitis due to the Tarsonemid mite, *Pediculoides ventricosus,* in Italy.

Pillers (A. W. N.). **Notes on Mange, and Allied, Mites for Veterinarians.**—*London,* Baillière, Tindall & Cox, 1921, xii+110 pp., 68 figs. [Price 12*s*. 6*d*. net.]

In this handbook a good deal of information is collected regarding mites that attack either animals or food, with notes on the beneficial

species, such as *Cheyletus*, which are said to be predacious on certain harmful species. Notes on the classification and synonymy of the mites concerned are included. Practical directions are given for treating mange and scab.

An appendix contains an account of the mites especially observed during military operations, and a tabular summary is given of the species dealt with, their systematic position and their hosts and habitats.

Lornie (W. S.). **The Sulphuration Treatment of Mange.**—*Vet. Record, London,* xxxiii, no. 1743, N.S. i, no. 49, 3rd December 1921, pp. 953–957.

An account is given of the treatment of mange in horses with sulphur dioxide in Egypt during the war. The apparatus and technique employed are described. At first only SO_2 was used, and gave encouraging results, but the addition of steam made a great improvement, by raising the temperature, and by bringing about the combination of SO_2 and H_2O to form H_2SO_3, which is evidently the ideal parasiticide. It should be borne in mind that the mixture, if exposed to air, takes up more oxygen and becomes H_2SO_4.

Animals badly affected with ticks were similarly treated, and after two hours, all the ticks were destroyed. A few camels suffering from mange were placed in the baths and responded satisfactorily to the treatment. Judging from his experience of treating over 200 cases, the author is convinced that this form of treatment with sulphur is an ideal method, being clean, expeditious, hygienic and economical.

Sergent (Ed.), Foley (H.) & Vialatte (C.). **Iconologie des *Rickettsia* signalées en 1914 chez des Poux infectés de Typhus exanthématique.** —*Arch. Inst. Pasteur Afr. Nord, Algiers,* i, no. 3, September 1921, pp. 215–217, 6 plates.

Further researches are described regarding the micro-organisms found in lice fed upon typhus cases, and particularly in lice that have transmitted typhus [*cf. R.A.E.*, B, iii, 33]. By feeding lice upon typhus cases before and during the course of the disease, it has been found that those fed during the incubation period are immune ; of those fed during the first days of the disease a small proportion are slightly infected ; in the succeeding days the proportion of infected lice increases, and the degree of infection also becomes more intense. From the 20th to the 25th day, the majority are infected, and the organisms are numerous in them. These infected lice transmit the causal organism to men and monkeys by biting. The organisms are found more frequently in the haematic liquid of the digestive tract than in smears of the crushed organs, and are present both in adult and in very young lice. They become more numerous in lice in proportion to the length of time elapsing after their meal of infected blood, but they are also found in the proportion of 1 : 5 in very young lice examined immediately after biting a typhus case. No analogous forms have been found in the thousands of lice dissected by the authors during the last ten years in Algeria, taken from healthy persons. The coccobacilli previously described [*loc. cit.*] have been named *Rickettsia*, and analogous forms have been described in trench fever, Rocky Mountain spotted fever, and also in healthy lice and other insects. The conclusions reached in 1914 are therefore confirmed, namely, that there is a remarkable coincidence of occurrence, in the bodies of lice, of the virus of typhus and of numbers of these organisms.

SERGENT (Ed.), FOLEY (H.) & VIALATTE (C.). **Transmission de Laboratoire du Typhus exanthématique par le Pou.**—*Arch. Inst. Pasteur Afr. Nord, Algiers*, i, no. 3, September 1921, pp. 218–230, 5 charts.

From observations on many cases studied in Algeria, the conclusions are reached that the bite of adult lice can infect man with typhus. Among the native population, in which this disease often occurs in a somewhat indefinite form, exhibiting special clinical features, it is possible that these virulent lice may have become infected by feeding on cases that exhibit no clear symptoms of typhus. Lice reared on men infected experimentally by lice taken from such a human carrier, transmitted the disease to a monkey, either by subcutaneous or intraperitoneal inoculation. A healthy monkey was then infected by inoculation of the blood of the diseased one. Infection is hereditary in the louse ; eggs derived from infected lice are capable of transmitting the disease.

VIALATTE (C.). **Sur des Formes atypiques de** ***Plasmodium praecox*** (*falciparum*).—*Arch. Inst. Pasteur Afr. Nord, Algiers*, i, no. 3, September 1921, pp. 236–239, 1 plate.

The seasonal oscillation between *Plasmodium praecox* and *P. vivax* in Morocco and the Mediterranean and sub-tropical regions has been commented upon by various authors [*R.A.E.*, B, v, 98, etc.]. In an investigation, during the summer–autumn period, of the blood of many malaria cases under treatment in the native infirmary at Kenitra, *P. praecox* and *P. vivax* were found in definite association five times, out of 281 cases examined. *P. praecox* was found in 143 cases, and of these, 35 showed atypical forms. The significance of these atypical forms is not understood. It may be an indication of an association between *P. praecox* and *P. vivax*, but the author hardly considers this probable, the morphological characters belonging rather to the young forms of *P. vivax*, and it seems scarcely likely that, in a whole series of preparations, most of which are taken from long-infected cases, *P. vivax* should be present only in the form of young schizonts. The hypothesis of double infection with a more or less prolonged latent existence of *P. vivax* does not seem satisfactory either, for at the time when the first generations of Anophelines emerge (in spring and early summer), *P. vivax* is in the great majority in old cases of infection. The Anophelines then feeding therefore chiefly acquire the gametes of *P. vivax*. When, however, the annual epidemic occurs as a result of this Anopheline activity, the majority of infections are found to be of the type of *P. praecox*.

On more than one occasion it has been noticed that abnormal forms of *P. praecox* have appeared during particularly severe outbreaks of malaria, but whether there is any connection between the two manifestations it is impossible to say. A similar relation seems to exist between the occurrence of a severe form of piroplasmosis and the presence of atypical forms of the parasite.

Another hypothesis is that the atypical forms observed represent a transitional stage between *P. praecox* and *P. vivax*, but much still remains to be discovered on this subject and further experiment is necessary before any conclusion can be reached,

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THE REVIEW OF APPLIED ENTOMOLOGY

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It is with great regret that the Imperial Bureau of Entomology has to record the death of Viscount Harcourt. As Secretary of State for the Colonies, and later as Chairman of the Honorary Committee of Management, Lord Harcourt took the keenest personal interest in this Bureau, and gave the utmost assistance in the development of its work.

Sergent (Ed.) & Sergent (Et.). **Etudes Epidémiologiques et Prophylactiques du Paludisme. (17e, 18e et 19e Campagnes en Algérie, en 1918, 1919 et 1920.)**—*Ann. Inst. Pasteur, Paris*, xxxv, no. 11, November 1921, pp. 801–813.

Except in 1920, the incidence of malaria was high during the period under review, owing to the weather conditions being favourable to mosquitos, and the prolonged summer of 1919 encouraged the disease, as the temperature necessary for development of the *Plasmodium* in the mosquito continued for a long period.

The range of flight of Anophelines seems to depend largely upon their situation; those inhabiting streams near a town, where the food-supply is close at hand, take only very short flights, while in the open country their range on the wing extends to about a mile, occasionally considerably more. In 1920, *Anopheles hispaniola* (*Pyretophorus myzomyifacies*) was found at an altitude of over 600 feet above its breeding-place.

In many localities the re-infection of towns by Anophelines brought on the railways is very evident. Anti-larval measures in such towns practically eliminate mosquitos during the hot weather, but they can be seen in November and December emerging in numbers from incoming trains at railway stations, where they always remain more or less localised.

It is of the greatest importance to know the date of the earliest Anopheline oviposition, in order to organise anti-malarial measures accordingly. When an individual of *Anopheles maculipennis*, after a blood meal, was kept at a temperature of 12° C. [54° F.], oviposition and hatching occurred normally. Newly deposited eggs of *A. maculipennis* were kept at a temperature of – 10° C. [14° F.] for five months. At the end of this period the temperature was raised to 22° C. [72° F.], but none of them hatched. The variety of *A. hispaniola* previously recorded in South Constantine, South Oran and in the Tell, has also been found near to Oued-Hamiz, and the characters distinguishing it are discussed.

An important source of the spread of malarial infection has arisen owing to the gradual migration of natives into the towns and villages of the interior. Especially during the war, when the French population was greatly reduced in numbers, the settlement of natives in the smaller centres has been followed by the introduction of a new strain of infection. This native strain is far more dangerous than the Serbian or Macedonian ones, owing to the natives not having received quinine treatment as the troops from the East have done. When an outbreak occurs in the mountain villages, it is similarly always more intense than one in the plains, where a relative immunity has been acquired. It is a matter of repeated observation that in a newly infected locality the spleen index is higher for adults than for children. A few cases of quartan malaria were recorded.

The conditions created by the war during the years under review greatly increased the difficulties of anti-malarial work. The use of quinine stopped almost completely; labour and petrol were almost unobtainable, and funds were not increased. The activities of the anti-malarial service in various departments are reviewed.

Following the theory of Roubaud regarding the rôle played by domestic animals as a protection against mosquitos [*R. A.E.*, B, viii, 141], it is always stables and shelters for animals that are first examined for Anophelines in Algeria, and it is there that they are

found in the greatest numbers. Animals are always kept in close proximity to houses as a precaution against thieves, but there are such numbers of Anophelines that the protection they afford is quite inadequate.

Kieffer (J.-J.). **Nouvelles Observations sur les Diptères Piqueurs de la Tribu des Ceratopogoninae.**— *Arch. Inst. Pasteur Afr. Nord, Algiers,* i, no. 3, September 1921, pp. 262–268, 2 figs.

This further contribution to the study of the Ceratopogoninae [*R.A.E.*, B, ix, 171] includes descriptions of the new species, *Culicoides langeroni,* from southern Tunisia, and *Holoconops mediterraneus,* which is abundant around Algiers and on the coast, and attacks man during the hottest hours of the day. A key to the species of *Holoconops* is given. Attention is called to the fact that the genus *Acanthoconops,* Carter [*R. A.E.*, B, ix, 133], including the two species, *albipes,* Meig. (*spinosipes,* Kieff.) and *spinosifrons,* Cart., is a synonym of *Styloconops,* Kieff. [*R. A.E.*, B, 171] of which *S. albipes* is the type.

Parrot (L.). **Note sur les Phlébotomes.**—*Arch. Inst. Pasteur Afr. Nord, Algiers,* i, no. 3, September 1921, pp. 269–278, 10 figs.

The conclusion is arrived at that *Phlebotomus bedfordi,* Newst., is really a variety of *P. minutus,* Rond. The geographical distribution of *P. sergenti,* Parr., is discussed and some anomalies noticed in the genital armature of certain individuals of *P. minutus,* Rond., *P. papatasii,* Scop., *P. perniciosus,* Newst., and *P. minutus* ? var. *africanus,* Newst., are described.

França (C.) & Parrot (L.). **Essai de Classification des Phlébotomes.** —*Arch. Inst. Pasteur Afr. Nord, Algiers,* i, no. 3, September 1921, pp. 279–284, 6 figs.

In a previous paper [*R.A.E.*, B, ix, 21] the authors proposed dividing the genus *Phlebotomus,* Rond., into two subgenera. Further investigation has led them to divide the genus into the following: *Prophlebotomus,* subg. n., *Phlebotomus,* s. str., *Brumptomyia,* subg. n., *Lutzia* and *Sergentomyia.* Keys, which must be regarded as provisional, are given to these subgenera and to the species contained in them.

Sergent (Ed.) & Sergent (Et.). **Organisation de la Lutte antipaludique à l'Armée d'Orient en 1917 et 1918.**—*Arch. Inst. Pasteur Afr. Nord, Algiers,* i, no. 3, September 1921, pp. 285–323, 2 figs.

The anti-malarial campaign of 1917 in the Balkans, described in a previous paper [*R.A.E.*, B, vi, 205], realised all expectations. In this paper the organisation of the 1918 campaign, carried on along the same lines, is reviewed.

van Saceghem (R.). **La Trypanosomiase du Ruanda.**— *Ann. Méd. Vet., Brussels,* lxvi, no. 7, July 1921, pp. 305–311.

Further observations confirm the theory that pathogenic trypanosomes are transmitted in nature by flies other than *Glossina* [*cf. R. A.E.*, B, v, 12, etc.]. The occurrence of trypanosomiasis amongst cattle in Ruanda, where tsetse-flies are absent, is recorded. The organism

concerned is described and is provisionally named *Trypanosoma ruandae*; it greatly resembles *T. congolense* and *T. pecorum*. The clinical aspect of the disease is also discussed. Experimental infection was successfully carried out on indigenous sheep, but the pathogenicity of the organism to equines could not be verified.

Van den Branden records *Stomoxys calcitrans* as the transmitter of *T. congolense* [*R. A.E.*, B, viii, 17] in the middle Congo, and in Ruanda *Stomoxys* is also believed to be the vector of *T. ruandae*. The organisms were easily isolated from the gut of the flies, but had disappeared by the following day. Trypanosomes could not be traced in the proboscis of *Stomoxys*. Experiments in infection by means of these flies are now in progress.

ROUBAUD (E.). **Fécondité et Longévité de la Mouche domestique.**—*C.R. Hebdom. Acad. Sci., Paris*, clxxiii, no. 22, 28th November 1921, pp. 1126–1128.

The reproductive powers and duration of adult life in the house-fly [*Musca domestica*] are discussed. It is considered that during hot weather in summer one individual produces at least 600 eggs in the course of 40 to 60 days.

BRUG (S. L.) & KORTHOF (G.). **Verslag van een Onderzoek naar de desinfecteerende Werking van Izal.** [A Report on an Investigation on the disinfecting Action of Izal.]—*Geneesk. Tijdschr. Ned.-Indië, Batavia*, lxi, no. 5, 1921, pp. 551–564.

Izal is inferior to creolin when used against mosquito larvae in the dilutions commonly employed, and is therefore not recommended as a larvicide. Creolin 1 part in 25,000 of water, izal 1 in 2,500, and sapocarbol 1 in 1,000, proved fatal in 24 hours to the larvae of *Culex*. The low insecticidal action of sapocarbol is remarkable; it contains 62·5 per cent. of cresol, and previous experimenters with cresol obtained satisfactory results.

MARTINI (E.). **Ueber die Eier unserer** *Anopheles*. [A Note on the Eggs of German Anophelines.]—*Centralbl. Bakt., Paras. Infekt., Jena*, Ite. Abt., Orig., lxxxvii, no. 5, 17th December 1921, pp. 362–365, 4 figs.

The more important differences between the eggs of *Anopheles maculipennis*, *A. bifurcatus* and *A. plumbeus* (*nigripes*) are figured and discussed.

KIEFFER (J.-J.). **Chironomides de l'Afrique Equatoriale. (1ère Partie.)**—*Ann. Soc. Ent. France, Paris*, xc, pt. 1, 1921, pp. 1–56, 2 plates.

The new species described are:—*Lepidohelea ornatipes* from Kamerun; *L. nilotica* and *Ceratopogon niligena* from the Sudan; *C. leucochaetus*, *C. kribiensis*, *Kempia pusilla*, *Atrichopogon brevicellula*, *A. conglomeratus* and *A. kribiensis* from Kamerun; *A. conglomeratus* var. *niloticus*, n., and *A. nilicola* from the Sudan; *Dasyhelea punctatipennis*, *D. nudipennis*, *Culicoides dentatus*, *C. bisignatus*, *C. citrinus*, *C. quadrisignatus*, *C. kribiensis* and *C. trisignatus* from Kamerun; *C. octosignatus* from the Belgian Congo; *C. nilogenus*, *C. signatus* and *C. nilophilus* from the Sudan; *Nilohelea albipennis* from the

Sudan; *Stilobezzia rufa* from Kamerun; and *Nilobezzia armata, N. armata* var. *flaviventris,* n., *N. armata* var. *albipennis,* n., and *N. armata* var. *fusca,* n., from the Sudan.

Keys are given to the species of the genera *Lepidohelea, Ceratopogon, Atrichopogon, Dasyhelea* and *Culicoides.*

Noc (F.). **Au Sujet de la Peste Murine à Dakar.**—*Bull. Soc. Path. Exot., Paris,* xiv, no. 9, 9th November 1921, pp. 516–519.

The rat, *Cricetomys gambianus,* must be considered as a vector of rat plague in Senegal. *Xenopsylla cheopis* has been taken on this species. *Mus alexandrinus* appears to be the most widely distributed, and *M. rufinus* takes the place of *M. decumanus* in human habitations.

The fleas so far observed on rats at Dakar are chiefly *X. cheopis,* and Heckenroth has also recorded *Pulex irritans.* The author has found *Echidnophaga gallinacea* in abundance. Although this species will attack rats, other mammals and man, it does not possess the same migratory habits as *X. cheopis,* and it cannot be definitely stated that it plays a similar part in the transmission of plague. *E. gallinacea,* when feeding on infected animals, excretes blood containing the causative organism of the disease. The organisms thus freed are ingested by rodents or the larvae of the fleas. Their ultimate fate requires further study as a possible explanation of the occurrence of chronic plague in rats, in view of the fact that small rodents are capable of acquiring immunity by repeated ingestion of living plague bacilli.

Franchini (G.). **Trypanosome de la Chauve-souris en Italie. Formes viscérales et Stades de Développement chez un Acarien Gamaside, le** *Leiognathus laverani* **n. sp.**—*Bull. Soc. Path. Exot., Paris,* xiv, no. 9, 9th November 1921, pp. 542–546, 2 figs.

Bats (*Vespertugo pipistrellus*) captured in the marshes in the vicinity of Bologna were found to harbour a few trypanosomes in the cardiac blood. These organisms do not multiply in the peripheral blood, but occur chiefly in the lungs and liver, and possibly other organs. The parasite is leishmaniform until the young trypanosomes appear. The crithidial forms were not found in the organs, though they have been recorded from the same bat in Alsace, in which case they form cysts in the stomach and intestine. Fleas and mites were taken on the bats; of these *Leiognathus laverani,* Berl., harboured crithidial forms and young trypanosomes, occasionally also adult trypanosomes similar to those found in the blood of the bats. In two mites, leishmaniform organisms and Herpetomonads were found in smears of the digestive tract, and these Acarids are probably the transmitters of natural infection in bats.

With reference to the hypothesis on the relation of trypanosomes of bats to endemic goitre in man [*R.A.E.*, B, ix, 120], it is pointed out that this disease does not exist in the provinces of Bologna and Ferrara.

Babault (G.). **Observations sur l'Adaptation zoophile des Anophèles en Savoie.**—*Bull. Soc. Path. Exot., Paris,* xiv, no. 9, 9th November 1921, pp. 564–566.

The author's observations with regard to the preference of *Anopheles maculipennis* for the blood of animals substantiate those by Roubaud [*R.A.E.*, B, viii, 141]. It is stated that in Savoy *A. maculipennis* does not attack man at all, but derives its food supply from domestic animals, mainly cattle.

Vialatte (C.) & Parrot (L.). **Phlébotomes du Maroc.**—*Bull. Soc. Path. Exot., Paris*, xiv, no. 9, 9th November 1921, p. 566.

The species recorded from Morocco are *Phlebotomus papatasii*, Scop., *P.* (*Sergentomyia*) *perniciosus*, Newst., *P.* (*S.*) *sergenti*, Parr., and *P.* (*Prophlebotomus*) *minutus* var. *africanus*, Newst.

Roubaud (E.). **La Différenciation des Races zootropiques d'Anophèles et la Régression spontanée du Paludisme.**—*Bull. Soc. Path. Exot., Paris*, xiv, no. 9, 9th November 1921, pp. 577–595, 3 figs.

Various criticisms of the author's theory on the relation of animals and Anophelines in connection with the incidence of malaria [*R. A.E.*, B, viii, 141] are reviewed.

The observations here described are to a large extent an answer to these objections, and are concerned with the effect of the change of food habits on the anatomy of the mosquito (*Anopheles maculipennis*). The influence of natural selection on mosquitos that have adopted domestic animals as their principal hosts has chiefly affected the mouth-parts, and particularly the dentition of the saw-like edge of the maxilla. In the normal mosquito, from a district where malaria is prevalent and man is the usual host, the number of "teeth" averages about 13, a number quite sufficient for the mosquito's needs. In districts where cattle are plentiful and the mosquitos feed exclusively on them, an average of 15 teeth is found, this being sufficient for feeding on cattle if the proportion of available cattle is sufficiently high, as compared with the number of mosquitos, to allow feeding to be easy and undisturbed. In districts where this occurs, malaria is absent.

But there are districts where cattle are present and the mosquitos evidently prefer them, but where, under favourable conditions, a certain amount of malaria also occurs. The reason for this is that the proportion of mosquitos as compared with the available cattle is so high that the former are sometimes (though unwillingly) compelled to feed upon man.

In such districts, owing to the greater difficulty of obtaining blood from cattle, specialisation in the mosquitos has been continued to a higher degree, as many as 18 teeth being found on the maxilla. The great benefit that the mosquito derives from a larger number of teeth in obtaining food from cattle, is shown by the fact that, in a large number of mosquitos captured in a certain district, the average number of teeth in freshly emerged specimens was 14·3, whereas the average number of teeth in gorged specimens was 16·6.

The author suggests that an examination of the number of teeth in the mosquitos of a given district will indicate the liability to malaria of that district. Where the teeth are very few the district is, of course, a malarious one, where, on the other hand, they are very numerous, the mosquitos, though they feed on cattle as their normal host, may by the severity of competition at any time be forced to feed upon man, and thus may give rise to a certain amount of malaria.

Wesenberg-Lund considered that the adaptation of mosquitos to cattle was a characteristic that they quickly acquired, as in Denmark malaria has only comparatively recently disappeared [*R. A.E.*, B, ix, 153]. The author, however, considers that this characteristic was only acquired over a considerable period of time, and explains the rapid disappearance of malaria by assuming that the mosquitos had already acquired a liking for cattle. but that the cattle were not available in

sufficient numbers to prevent their being forced to feed on man. As soon as the proportion of cattle was raised, a safe equilibrium was reached. If these facts are correct, no protection can be expected from the introduction of cattle into highly malarious districts where the mosquitos have not yet acquired a taste for them, but it is worth consideration whether the introduction into such districts of Anophelines that have acquired a liking for cattle, together with the cattle themselves, might not produce a satisfactory protection, the Anophelines concerned replacing those already there.

LARROUSSE (F.). **La Myiase oculaire à** *Oestrus ovis*, **L., dans la Région Parisienne.**—*Bull. Soc. Path. Exot., Paris*, xiv, no. 9, 9th November 1921, pp. 595–601, 5 figs.

A first-stage larva of *Oestrus ovis*, L., was removed from the eye of a patient suffering from acute conjunctivitis. This is apparently the third case of this kind occurring in France. As the first-stage larva is frequently confused with that of *Rhinoestrus purpureus*, Brauer, the distinguishing characters of these larvae and illustrations of them after Portchinsky [*R. A.E.*, B, i, 134] are reproduced.

The author considers the case recorded by Fülleborn [*R. A.E.*, B, viii, 151, 169] to be due to *Oestrus ovis*.

BODKIN (G. E.). [**Report of the Government Economic Biologist.**]—*Ann. Rept.* [*British Guiana*] *Dept. Sci. & Agric., 1919, Demerara*, 1920, Appx. iii, 9 pp. [Received 29th December 1921.]

Mosquito breeding-places were studied in British Guiana in 1919, and the following were found :—*Anopheles argyritarsis*, R.-D., in small drains overgrown with grass ; *Aëdomyia squamipennis*, Theo., in a trench covered with *Salvinia* ; *Aëdes* (*Culicelsa*) *taeniorhynchus*, Wied., in a trench, the adults being very prevalent in April in the late evening and early morning ; and *Taeniorhynchus* (*Mansonia*) *titillans*, Walk., in trenches overgrown with grass and water-lilies.

The ticks collected included :—*Amblyomma cajennense*, F., on man and armadillo ; *A. maculatum*, Koch, on a dog ; and *A. concolor*, Neum., and *A. pacae*, Arag., on armadillos.

BRUES (C. T.). **Insects as possible Carriers of Poliomyelitis Infection.**—*Dept. Health, New York*, Reprint Ser. no. 60 (Monogr. Ser. no. 16), July 1917, 30 pp., 2 maps, 5 figs. [Received 29th September 1921.]

This is a report of the work undertaken to obtain evidence whether or not insects play an important part in the spread of poliomyelitis. The conclusions arrived at are not so definite as had been hoped, and are to some extent conflicting. They do not completely disprove the idea that *Stomoxys calcitrans* is implicated, although the behaviour of the present epidemic does not favour this view. To discard it is to set aside evidence derived from two sets of experiments, which seems unwise at the present time of uncertainty. So far as present knowledge goes, mosquitos and Tabanids have no connection with the transmission of this disease. It has been shown to be possible, with one assumption, to form a working hypothesis based upon rats and fleas, which seems to fit the epidemiological observations. The assumption that the rat can act as a reservoir of the virus of this disease should be capable of

experimental proof, and this should be attempted. There is a continual appearance of circumstantial evidence that some other insect or warm-blooded animal, or both, influence the progress of the epidemic.

The unknown factors, which cause the greatest confusion at present, are the length of the incubation period, the number of mild, abortive or unrecognisable cases and carriers of the virus and their relation to infection and immunity, the duration of infectivity in clinically recognised cases, and the presence of the infective agent in insects, domestic animals or other possible intermediate hosts or reservoirs of the virus.

DYAR (H. G.). **The Species of *Finlaya* allied to *terrens* Walker (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 10–12, October–December 1921, pp. 151–153.

The species recorded are: *Aëdes* (*Finlaya*) *podographicus*, D. & K., from Mexico; *A.* (*F.*) *heteropus*, sp. n., bred from water in bamboo joints, from Costa Rica; *A.* (*F.*) *terrens*, Wlk., from Brazil, Trinidad, the Guianas, Panama and Mexico; *A.* (*F.*) *thorntoni*, D. & K., from Nicaragua and Panama; and *A.* (*F.*) *argyrithorax*, Bonne-Wepster & Bonne.

DYAR (H. G.). **New Mosquitoes from Costa Rica (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 10–12, October–December 1921, pp. 154–155.

Culex (*Carrollia*) *metempsyta*, sp. n., and *Haemagogus anastasionis*, sp. n., are described from Costa Rica. *C.* (*C.*) *bonnei*, n.n., is proposed for the mosquito recorded from Surinam as *C. iridescens*, Lutz, and a key to the species of the subgenus *Carrollia* is given.

DYAR (H. G.). **Note on *Melanoconion indecorabilis* Theobald (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 10–12, October–December 1921, pp. 155–157.

The male of *Culex* (*Choeroporpa*) *indecorabilis*, Theo., is described from Brazil.

DYAR (H. G.). **Note on *Culex declarator* D. & K. (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 10–12, October–December 1921, pp. 194–195.

The view expressed in a paper noticed earlier [*R.A.E.*, B, ix, 72] that *Culex bilineatus*, Theo., and *C. declarator*, D. & K., are synonymous with *C. virgultus*, Theo., is not now upheld, and the characters distinguishing these species are given.

FROGGATT (W. W.). **Sheep-maggot Flies and their Parasites.**—*Agric. Gaz. N.S.W., Sydney*, xxxii, pts. 10–11, October–November 1921, pp. 725–731 and 807–813, 7 figs.

The observations contained in this paper were made during the investigations carried out at the Government Sheep-fly Experiment Station at Warrah in 1920–21. The earlier methods adopted for the destruction of sheep-maggot flies by means of Hymenopterous parasites have already been noticed [*R. A.E.*, B, vii, 100], and subsequent experiments are described.

It has been claimed that, if introduced, new Hymenopterous parasites would be more effective than *Nasonia brevicornis*, which appears to be indigenous, but this has not yet been proved. This Chalcid is primarily a parasite of *Musca domestica*, and in every record of it in the paddocks it has been found in pupae of *Chrysomyia albiceps*. It has only been obtained from the pupae of injurious Muscid flies, and there are no known hyper-parasites. It is estimated that the loss from sheep-fly infestation is over £2,000,000 annually, so that even if the objection that this parasite does not destroy more than 25 per cent. of the pupae is a valid one, its value expressed in money must be considerable [*cf. R.A.E.*, B, ix, 155–157].

Stenosterys fulvoventralis, sp. n. (of which a description by Dodd is here given) is probably identical with the species recently described under the name of *Australencyrtus giraulti* [*R.A.E.*, B, x, 1]. A brief account is given of the following: *Chalcis calliphorae*, Frogg.; *Hemilexomyia abrupta*, Dodd, bred from pupae of *Ophyra nigra* and *Calliphora villosa*; *Dirhinus sarcophagae*, Frogg., bred from pupae of *Sarcophaga aurifrons* and larvae of *Calliphora villosa*; and *Spalangia grotiusi*, Gir., and *S. muscidarum*, Richardson, bred from blow-fly pupae.

The European Braconid, *Alysia manducator*, Panz., is a parasite of all flies, particularly Syrphids, and for this reason the author protests against proposals to introduce a Hymenopteron that is a certain enemy of such valuable flies.

Attention is called to the following changes in nomenclature of Australian blow-flies: *Chrysomyia albiceps*, Wied., previously recorded as *Calliphora* (*Pycnosoma*) *rufifacies*; *Chrysomyia flaviceps*, Wlk., previously recorded as *Calliphora* (*P.*) *dux*, Esch.; *Neopollenia stygia*, F., previously recorded as *Pollenia* (*Calliphora*) *villosa*; *Paracalliphora oceaniae*, R.-D., previously recorded as *Anastellorhina* (*Calliphora*) *augur*; and *Eumusca australis*, Meig., previously recorded as *Musca corvina*.

LAWRENCE (H.). **Further Observations upon the Pathogenicity of *Demodex* (Owen) in the Human Being and of other Parasites producing Skin Diseases.**—*Med. Jl. Australia, Sydney*, 8th Yr., ii, no. 20, 12th November 1921, pp. 419–425, 13 figs.

Further cases of skin eruptions due to *Demodex* and unidentified Acari are recorded [*cf. R.A.E.*, B, ix, 186]. Follicular or red mange in dogs is caused by *Staphylococcus pyogenes albus*, infection being due to the presence of the mite, *Demodex canis*, which is usually present in numbers. Cats were found infested with *Sarcoptes* (*Acarus*) *scabiei*. The author thinks these parasites may account for some irregular cases of scabies in man.

MASON (F. A.). **Biology in its Relationship to the Leather Industry.**—*Leather Trades' Year Book 1921, London*, 13th edn., pp. 98–108, 3 plates, 1 diagram.

This paper emphasises the need for the study of biology in connection with the better production of leather. It is reported that in a tannery handling 130,000 hides a year, 40,000 of these were damaged by warble-flies [*Hypoderma*], with a depreciation in value of 50 per cent.

Among the organisms mentioned as affecting tanners and fell-mongers are the mite, *Psoroptes communis*, the Hippoboscid, *Melophagus ovinus*, the tick, *Ixodes ricinus* (*reduvius*), and the blow-fly, *Lucilia sericata*.

SEYMOUR-JONES (A.). **Warble Flies and their Maggots in Cattle.**—*Leather Trades' Year Book 1921, London*, 13th edn., pp. 169–188, 20 figs.

The bionomics of warble-flies (*Hypoderma bovis* and *H. lineatum*) have already been noticed [*R. A.E.*, B, iii, 19, 23, etc.]. Experiments are described to show how the flies attack animals.

The two chief remedial measures are the prevention of egg-laying on cattle and the extermination of the fourth-stage larvae as they emerge. The former policy has been abandoned for fear that it might cause the flies to change their habits and seek other hosts. The most successful method of exterminating the larvae is to squeeze them out with the fingers; this has been adopted in Ireland [*R. A.E.*, B, ix, 22]. A mixture of tobacco dust and lime has effected the destruction of 96 per cent. when applied to the back of cattle. No unnecessary irritation of the skin should be caused as this injures the animal and the hide for tanning purposes.

It is remarked that the warble-fly infesting the red deer (*H. diana*) does not attack cattle. The horse is the only animal known to have been infected with all three species, and such cases are rare.

DODD (S.). **Tick Paralysis.**—*Jl. Comp. Path. & Therap., London*, xxxiv, pt. 4, December 1921, pp. 309–323.

The information on tick paralysis in Australia contained in this paper has already been noticed from another source [*R. A.E.*, B, ix, 139].

LAMBORN (W. A.). **Federated Malay States Malaria Bureau Report, 1920.**—Supplement to *F.M.S. Govt. Gaz.*, 4th November 1921, pp. 8–13.

Evidence is adduced to show that the effect of clearing the jungle is that the jungle species of Anophelines are replaced by open country ones. The entire absence of Anopheline larvae in certain pools and ponds was accounted for by the presence of various predacious aquatic insects, including larvae of Neuroptera, BELOSTOMIDAE and large numbers of an Anthomyiid fly of the genus *Lispa*. A study is in progress of the conditions favouring the development in artificial breeding places of the various mosquito larvae usually found. The eggs of *Aëdes albopictus* (*Stegomyia scutellaris*), not being furnished with floats, may sink with a moderate shower of rain, and the female therefore seeks well sheltered places for oviposition. The larvae are also swept away in running water owing to lack of caudal hooklets.

Further investigations showed that *A. barbirostris*, *A. hyrcanus*, *A. maculatus* and *A. leucosphyrus* can occur in rivers whatever the force of the current. A description of the caudal tufts, by means of which they maintain their position, and the influence of oil as a larvicide on those species unable to attach themselves to supports has already been noticed [*R. A.E.*, B, viii, 84; ix, 134].

Much work has been done on the breeding of Anophelines in the laboratory, when it was hoped to settle such problems as the relative status of *A. subpictus*, Grassi (*rossi*, Giles) and *A. vagus*, Don. (*rossi* var. *indefinitus*, Ludl.), that of *A. hyrcanus* and its var. *peditaeniatus*, the relationship, if any, between *A. maculatus* and *A. karwari*, and various other points. This investigation has afforded much information, and, so far as is known, is the first attempt to demonstrate in Anophelines (by the unassailable proof obtained by breeding) the inheritance of minute variations, which has been proved to occur in the case of other insects. A study was made of different larvae in various alga-containing media, and it was ascertained that *A. maculatus* and *A. karwari* have a predilection for certain filamentous algae, particularly a species of *Spirogyra*. All species, except jungle ones, thrive in the laboratory on a species of flagellate protozoon, *Euglena viridis*, and *A. hyrcanus* and *A. barbirostris* can thrive on a species of *Volvox* when it is immature and small enough for their consumption. The only jungle species that thrived on *E. viridis* was *A. leucosphyrus*.

A study of the seasonal prevalence of algae was commenced, and attempts made to obtain laboratory cultures, but with little success owing to the limited knowledge of these organisms. A small unicellular alga isolated from a small muddy pool throve luxuriantly in a medium of thoroughly decomposed rice water and similar subcultures. On this *A. vagus* was bred from egg to adult ; a similar attempt with *A. maculatus* was unsuccessful, though a few larvae attained half-growth very slowly.

Records as to the seasonal prevalence of Anophelines show that *A. vagus* oviposited month by month from March onward, and that *A. maculatus* only failed to do so in September. It was found that owing to the drying up of pools during a season of drought in July, larvae of *A. vagus*, in the absence of the favoured breeding places, increased largely during the earlier rains in fish ponds, where they usually occur sparingly. Though *Aëdes argenteus* (*Stegomyia fasciata*) has been reported as the prevalent species in the vicinity of Kuala Lumpur, in no instance was it captured or bred from among a total of 3,850 mixed Culicid larvae obtained, which were mainly *Aëdes* (*S.*) *albopictus*.

Further investigations were made on the habits of a species of *Ceratopogon*, a midge that attacks Anophelines. It breeds in small muddy pools, from which pupae have been obtained. The midges have been found attached to the abdomen of their host, with the object of depriving them of their meal rather than obtaining the juices from them.

The discovery of a Protozoon in the gills of the larvae of *Aëdes* (*S.*) *albopictus* has already been noticed [*R.A.E.*, B, ix, 190]. A study of the factors influencing larval coloration was made, particularly in the case of *Anopheles hyrcanus*. The possible transmission of malaria from an infected mosquito to its offspring was investigated in the case of *A. maculatus* with negative results. Biting experiments are still being made with *A. aconitus*, *A. barbirostris*, *A. hyrcanus*, *A. ludlowi* and *A. fuliginosus*. Local outbreaks of malaria were investigated with the object of testing the continued efficiency of drainage schemes, and some ravines were drained and examined as to the presence of breeding places.

Tower (W. V.). **Mosquito Survey of Mayaguez.**—*Porto Rico Agric. Expt. Sta., Mayaguez,* Circ. 20, 2nd November 1921, 10 pp., 4 plates.

The mosquito-borne diseases occurring in Mayaguez, Porto Rico, are malaria, yellow fever, dengue and filariasis (elephantiasis). Malaria is most prevalent on the south coast, especially where there are large tracts of coastal swamps and where sugar cane is grown under irrigation. This disease caused 1,528 deaths in the island in 1918, and 1,576 in 1919. Of the eight species of mosquito found during the survey here described, only three are commonly met with. *Culex fatigans* (*quinquefasciatus*) breeds wherever there is standing water, and is generally found in open containers about houses. *Aëdes argenteus* (*aegypti*), the yellow fever mosquito, is always found in clear water, in covered rain-water barrels and cisterns, and in places where there is no direct sunlight. The malarial mosquito of Porto Rico is *Anopheles albimanus*, and *A. grabhami* is also found ; the former occurs in rain-water barrels and cattle troughs, in cane fields and flooded pastures, in streams bordered with grass, and in irrigation and drainage ditches. During the dry season, the rain-water barrel is the most prolific breeding-place, especially in the outlying parts of the city ; in the city proper most of the houses are supplied with running water, and therefore small containers are not necessary ; if this small water storage system could be eliminated altogether, a great improvement would undoubtedly be effected. Where cisterns of the old Spanish type still occur, they should be covered with large planks over which cement is placed, and the conductors should be fitted with wire screens so that adult mosquitos cannot enter them. The habits of the species in question, in water and in flight, are briefly discussed, and general recommendations for a campaign against mosquitos are given.

Pillers (A. W. N.). **Cat Flea (*Ctenocephalus felis*) Larvae in large Numbers upon the Host.**—*Vet. Jl., London,* lxxviii, no. 1, January 1922, pp. 21–22, 1 fig.

Ctenocephalus felis is recorded as occurring in large numbers in the egg and larval stages on cats. The eggs readily drop off the host after being laid, and hatch in from two to four days. The larvae are very sensitive to light ; they pupate in from seven to thirty days after emergence, and the adults appear from five to ten days later. The period from egg to adult occupies on the average about twenty-eight days.

Gabert (H.). **Traitement des Gales du Lapin.**—*Vie Agric. et Rur., Paris,* xix, no. 53, 31st December 1921, pp. 473–474, 2 figs.

Mange of the ears in rabbits is caused by *Psoroptes communis*, and is visible at first only by a minute yellowish crust deep down in the auditory tract. The animal holds its head down with the ear always lowered. At this stage the disease is easily cured by injecting a few drops of olive oil or tobacco extract with a small syringe. For this purpose, tobacco is used at the rate of 3 oz. to 5 pints of water, reduced to one-third by boiling. For a more advanced stage, a mixture of 1 tablespoonful of carbolic acid to 2 tablespoonfuls of glycerine in 1½ pints of water is advised. A simple remedy for the disease in any stage is a mixture of one part of potassium pentasulphide to five of water, injected warm after filtering ; or a warm solution of 3 per cent. cresyl, mixed with two parts of oil and one part oil of

turpentine. This form of mange is very contagious not only in rabbits, but in other animals, particularly horses. Seriously infected animals should therefore be killed. As *P. communis* is killed by a temperature of 95° F., the hutches can be disinfected by washing them down with boiling water.

Sarcoptic mange, caused by *Sarcoptes scabiei* var. *cuniculi*, and the form caused by *S. notoedres*, begins in the head, generally about the nose, and gradually covers the face and ears, sometimes the paws, and occasionally the whole body. It appears in the form of a greyish crust, very thick and adherent, covering a thickened, inflamed and bleeding skin, with much discharge. The animals become very thin, and sometimes die. The skin should be shaved and washed with warm soapy water, followed by applications of Helmerich's ointment, cade (juniper) oil, or balsam of Peru at a strength of 1 : 8.

SOBRERO (L. R.). **La Mosca brava. Manera de evitar los Perjuicios que ocasiona entre los Animales.** [*Stomoxys calcitrans.* Prevention of Injury to Animals.]—*Gaceta Rural, Buenos Aires*, xv, no. 172, November 1921, pp. 465–473, 5 figs.

Stomoxys calcitrans is one of the most troublesome pests of domestic animals in Argentina. The life-cycle, habits, method of injury and the various stages of this fly are described. The methods suggested for destroying the immature stages and catching the flies as they emerge from the manure or straw heaps in which they have bred have been noticed in previous papers [*R. A.E.*, B, i, 96–98 ; viii, 189].

NETOLITZKY (F.). **Käfer als Nahrungs- und Heilmittel.** [Beetles as Food and Medicine.]—*Koleopt. Rundschau, Vienna*, vii, no. 9–10, 25th February 1919, pp. 121–129 ; viii, no. 1–3, 20th September 1919, pp. 21–26, 47–60.

This paper reviews existing information regarding beetles used as food and medicine. The MELOIDAE are the group chiefly concerned as regards medicine, the blister-beetles of the genera *Epicauta*, *Lytta*, *Lydus*, *Meloë* and *Mylabris* being well known in this connection. The use of certain insects as food is based on the flavour imparted by the irritant principle in them, while many larvae with a high fat or albumen content are a valuable addition to the diet of vegetarian races of man.

NETOLITZKY (F.). **Insekten als Heilmittel.** [Insects as Medicine.]—Separate from *Pharmazeut. Post, Vienna*, September 1916, 45 pp. [Received 10th January 1922.]

This is a review of many records of the use of insects in popular medicine. The basis for this use is the fact that they contain a chemical, mechanical or reflex irritant. Except in the case of cantharidin, the chemical character of these irritant substances is little known. Insect-eating animals, such as the hedgehog, are comparatively immune to these poisons.

INGRAM (A.) & MACFIE (J. W. S.). **West African Ceratopogoninae.**—*Ann. Trop. Med. & Parasit., Liverpool*, xv, no. 4, 30th December 1921, pp. 313–376, 1 plate, 23 figs.

This paper is a continuation of a series already noticed [*R. A.E.*, A, ix, 25, 76, 201]. Certain gaps occurring in previous descriptions have now been filled in

Among the species dealt with the following are new, and except where otherwise stated, they were collected from the Gold Coast: *Culicoides corsoni*; *C. nigeriae*, from Nigeria; *C. inornatipennis*, C., I. & M., var. *rutilus*, n., reared from material from the bases of banana stumps, and from a rot-hole in a silk-cotton tree; *Dasyhelea nigeriae*, from Nigeria; *D. boothi*, from Nigeria; *D. retorta*, from Sierra Leone; *Atrichopogon africanum*; *A. elektrophaeum*; *A. perfuscum*; *A. chrysosphaerotum* and *A. homoium*, reared from rotten wood from a canoe; *Kempia ochrosoma*, reared from plants of the water-lettuce (*Pistia stratiotes*); *Monohelea litoraurea*; *Eukraiohelea africana*, gen. et sp. n., and *E. versicolor*, reared from *P. stratiotes*; *Schizodactylus telmatoscopus*, gen. et sp. n., found in puddles of dirty water; *Sphaeromias* (*Johannsenomyia*) *litoraurea*, from a drain and from plants of *P. stratiotes*; *Bezzia foyi*, from Nigeria; *Probezzia pistiae*, reared from *P. stratiotes* (the larvae, although leading an aquatic existence, were frequently reared to the adult stage in plants kept merely moist); *P. stephensi*, from *P. stratiotes*; and *Dicrobezzia nigritibialis*, found in algae growing in one of the reservoirs of the Accra waterworks.

Macfie (J. W. S.). **The Effect of Saline Solutions and Sea Water on** *Stegomyia fasciata*.—*Ann. Trop. Med. & Parasit., Liverpool*, xv, no. 4, 30th December 1921, pp. 377–380.

From the results of the experiments described it would appear that a 1·0 to 1·4 per cent. solution of common salt or an equivalent strength of sea water would effectually prevent the larvae of *Aëdes argenteus* (*Stegomyia fasciata*) from developing to the adult stage [*cf. R.A.E.*, B, ii, 84; iv, 27]. Sea water used for flushing drains, gutters, market places, etc., would kill the larvae and eggs, and even should the adults oviposit in the ensuing puddles, the eggs would succumb immediately. There is no evidence that the larvae could become accustomed to such degrees of salinity.

MacGregor (M. E.). **The Structural Differences in the Ova of** *Anopheles maculipennis*, *A. bifurcatus* **and** *A. plumbeus*.—*Ann. Trop. Med. & Parasit., Liverpool*, xv, no 4, 30th December 1291, pp. 417–426, 1 plate.

The contents of this paper are indicated by its title.

Stephens (J. W. W.). **Malaria on a Venezuelan Oilfield.**—*Ann. Trop. Med. & Parasit., Liverpool*, xv, no. 4, 30th December 1921, pp. 435–444, 2 plates.

The occurrence of malaria among the native population and the white staff of a Venezuelan oilfield is discussed. A survey of the district during August showed the Anopheline breeding-places to be definitely restricted to a swamp overgrown with a variety of grasses, and a clay borrow-pit some three miles away from the camp. On the oilfield itself sixteen individuals of *Anopheles* (*Cellia*) *argyritarsis* were captured, none of which harboured sporozoites, though, according to Trovar, this mosquito is a transmitting agent in Venezuela. The fish, *Gambusia* (*Poecilia*) *tridentigera*, *Haplochilus* sp. and *Chromides* (*Acara*) *dorsigera* were abundant in the small streams and in the swamps. Suggestions are given for drainage, and for general measures against malaria, as adapted to the local conditions.

EVANS (A. M.). **Notes on Culicidae in Venezuela.**—*Ann. Trop. Med. & Parasit., Liverpool*, xv, no. 4, 30th December 1921, pp. 445–454, 2 plates, 3 figs.

In the course of the investigations in Venezuela described in the previous paper the following mosquitos were collected: *Anopheles argyritarsis*, R.D., *A. albimanus*, Wied., *A. albimanus* var. *tarsimaculatus*, Goeldi, *A. pseudopunctipennis*, Theo., *Aëdes serratus*, Theo., *A. scapularis*, Rond., *A. trivittatus*, Coq., *A. argenteus*, Poiret (*Stegomyia fasciata*, F.), *Culex* (*Neomelanoconion*) *chrysothorax*, Newstead & Thomas, *C. coronator*, D. & K., *C. nigripalpus*, Theo., *C. virgultus*, Theo., *C. fatigans*, Wied. (*quinquefasciatus*, Say), *Psorophora posticata*, Wied., and *Joblotia digitata*, Rond.

The morphological characters of *Anopheles argyritarsis* and *A. albimanus* are discussed.

DAVEY (J. B.) & NEWSTEAD (R.). **Mosquitoes and other Bloodsucking Arthropods of the Upper Shiri River, Nyasaland.**—*Ann. Trop. Med. & Parasit., Liverpool*, xv, no. 4, 30th December 1921, pp. 457–462.

The species dealt with include ticks, Psychodids, Tabanids, and the following mosquitos: *Anopheles* (*Myzorhynchus*) *mauritianus*, Grp., *A.* (*Cellia*) *pharoensis*, Theo., *A.* (*Pyretophorus*) *costalis*, Lw., *A.* (*Myzomyia*) *funestus*, Giles, *Mansonioides uniformis*, Theo., *Culex tigripes*, Grp., *Ingramia* (*Mimomyia*) *uniformis*, Theo., *Etorleptiomyia mediolineata*, Theo., and *Taeniorhynchus aurites*, Theo.

BLACKLOCK (B.). **Breeding Places of Anopheline Mosquitoes in Freetown, Sierre Leone.**—*Ann. Trop. Med. & Parasit., Liverpool*, xv, no. 4, 30th December 1921, pp. 463–471, 5 plates, 3 maps.

With a view to ascertaining whether the streams traversing Freetown and referred to by previous authors as Anopheline breeding places still act as such, the observations here described were carried out at the end of the dry season of 1921. The results obtained show that the breeding places are present in largest numbers at the lower end of the stream and become less numerous as one proceeds through the town. They occur again above the town, but not in such abundance as below. The residual breeding places at the end of the dry season are either at the edge of the winding and eroded bed of the stream just before its entrance into the sea, or in the shallow water, well protected by vegetation and extending over a large surface, found at the places of origin of the streams.

Anopheles costalis, which is the predominant species at the end of the dry season, was the only Anopheline taken. In the early days of mosquito investigation in Freetown this species was also the commonest species at the end of the wet season. Owing to lack of time the dissection of adults has been postponed for a future date.

The previous suggestions for dealing with the Anopheline breeding places are reviewed. The entire obliteration of the streams appears to be the only permanently effective method of dealing with them, though whether such a scheme would be practicable can only be decided after considerable investigation.

BLACKLOCK (B.). **Notes on an Apparatus for the Individual Breeding of Mosquitoes.**—*Ann. Trop. Med. & Parasit., Liverpool*, xv, no. 4, 30th December 1921, pp. 473–477, 5 figs.

By means of the apparatus here described the breeding of individual mosquitos from any stage in which they are collected is facilitated,

and a complete record of this and all the subsequent stages is possible. Owing to its small size it is easily portable and convenient for use in the tropics.

NEDERGAARD (N.). **Malaria in Eastern Cuba.**—*Amer. Jl. Trop. Med., Baltimore, Md.*, i, no. 6, November 1921, pp. 381–388, 2 figs.

Most of the population of Cuba lives in towns, and shows a much lower percentage of malarial infection than that of Jamaica, which is largely employed on work in close proximity to pools, swamps and sluggish streams where Anophelines abound. The economic aspect of the malaria situation on the plantations of Eastern Cuba needs further attention. Buildings and quarters for labourers should be chosen and constructed under the approval of a sanitary expert, for the actual cost of inefficiency and losses due to malaria is much greater than the cost of efficient prevention.

CROSS (H. E.) & PATEL (P. G.). **A Note on the Transmission of Surra by Ticks.**—*Punjab Dept. Agric., Lahore*, Vet. Bull. no. 6, 1921, 3 pp. [Received 10th January 1922.]

All investigations regarding the transmission of surra have hitherto been carried out with a few species of Tabanids, *Stomoxys calcitrans*, and fleas. Investigations led the authors to conclude that some Arthropod that can survive for over a year might also act as a vector. It was noticed that outbreaks of surra often occur at intervals in the same district and stables, apparently without any introduction of the disease into that district; and in one outbreak the disease first appeared among ponies that were healthy and had come from a surra-free area, and that were placed in a stable that had not been used for two years.

Only one tick of the genus *Ornithodorus* was known in the Punjab, namely, *O. lahorensis*. During the present investigations a new and allied species, *O. crossi*, Brumpt, was found; this species was found in large numbers in the Murree hills. Many experiments in transmission of surra by the agency of this tick are recorded in detail; it was found that the ticks transmitted the disease to a healthy rabbit 67, 83 and 101 days after feeding on an infected animal, but were not infective after intervals of one minute to 46 days. This would indicate that there is a life-cycle of the trypanosome within the tick. How long the tick can remain infective, what changes take place in the life-cycle of the trypanosome within the tick, and the minimum number of ticks necessary to transmit the disease have not yet been determined; neither is it known whether other species of ticks are capable of acting as vectors. The foregoing facts explain, however, why surra breaks out yearly or periodically in the same stables and in the same districts without any known importation of the disease. The fact that the disease appears during hot and rainy months may be due to the fact that many species of ticks hibernate during the cold months and become active in the hot and rainy season, the disease being rapidly disseminated among animals during this season by Tabanids.

East Coast Fever and its Eradication.—*Jl. Dept. Agric. Union S. Africa, Pretoria*, iii, no. 6, December 1921, pp. 515–521.

The position with regard to African Coast fever, particularly in Natal and the Transvaal, is very serious. An account is given of the

disease, of the parasite, *Theileria parva*, causing it, and of the brown tick, *Rhipicephalus appendiculatus*, which is the chief transmitting agent [*R. A.E.*, B, viii, 129, &c.]. The conditions necessary for the spread of the disease are discussed and it is pointed out that it can only be eliminated by making transmission by ticks impossible, or by rendering the cattle immune. The importance of controlling movements of cattle and of dipping and hand dressing are explained [*R. A.E.*, B, ix, 83–85]. The risks of inoculation as a preventive are discussed ; this method is considered useless, and is said to lead to wholesale infection of the transmitting ticks and perpetuation of the disease.

Hearle (E.). **The Importance of Mosquitoes, with Notes on some British Columbia Species.**—*Proc. Entom. Soc. Brit. Columbia, Victoria*, Econ. Series, nos. 13 and 15, June 1921, pp. 132–135, 2 plates. [Received 12th January 1922.]

In British Columbia mosquitos are one of the chief economic factors and seriously affect agriculture. A list is given of those taken during a preliminary survey of the Lower Fraser valley, including *Anopheles punctipennis*, Say, and *A. maculipennis occidentalis*, D. & K.

Rodenwaldt (E.). **De Pilotaxie van Anophelinen uit Nederlandsch Oost-Indië.** [The Pilotaxy of Anophelines from the Dutch East Indies.]—*Tijdschr. Ent., The Hague*, lxiv, no. 3–4, 31st December 1921, pp. 147–160, 1 fig.

This study of the pilotaxy of Dutch East Indian Anophelines as a means for differentiating the species is limited to certain parts of the body, especially the sides of the thorax, chiefly because only dried specimens were available.

Rüschkamp (P. F.). **Zur Biologie der Leptinidae. Ins. Coleopt.** *Leptinus testaceus*, **Müll, der „ Mäusefloh."** [On the Biology of the Leptinidae. *L. testaceus*, the " Mouse flea."]—*Tijdschr. Ent., The Hague*, lxiv, no. 3–4, 31st December 1921, pp. 161–174.

The author considers that the occurrence of *Leptinus testaceus* in the fur of small mammals is a case of ectoparasitism, instances of which are very rare in Coleoptera.

Herms (W. B.). **Distributional and Ecological Notes on Anopheline Mosquitoes in California.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 5, October 1921, pp. 410–414. [Received 13th January 1922.]

A detailed study of the distribution of Anophelines over a large area such as California, which comprises 153,650 sq. miles, is extremely difficult, but an attempt has been made in which 18,000 miles were covered at elevations ranging from about 200 ft. below sea-level to about 10,000 ft. above it. Although it was intended to be a malaria-mosquito survey, all available mosquitos were included in every collection in order to ascertain the relative abundance of Anophelines in any one locality. In all, 6,650 mosquitos were collected, including *Anopheles quadrimaculatus occidentalis*, D. & K., *A. punctipennis*, Say, and *A. pseudopunctipennis*, Theo.

All three species are partial to the collections of *Spirogyra*, which provide a shelter against certain natural enemies. *A. quadrimaculatus*

occidentalis breeds mainly in clear pools with abundant vegetation and open to sunshine; *A. punctipennis* apparently prefers quiet, shady pools, and *A. pseudopunctipennis* clear, shallow pools along the edges of receding streams. *A. quadrimaculatus occidentalis* invades houses, and is therefore of greater importance as a malaria carrier, while *A. punctipennis* bites chiefly out of doors. The males of these species disappear about the middle of November, and reappear in the following year during the last week in April. *A. quadrimaculatus occidentalis* passes the winter in the adult stage. Egg-laying begins in the warmer days of February and March. It is advised that anti-mosquito operations should begin in the autumn with a strong intensive campaign to eradicate the last brood, and be followed by another early spring campaign to eliminate the first brood.

FREEBORN (S. B.). **The Seasonal History of** *Anopheles occidentalis* **D. & K., in California.**—*Jl. Econ. Ent., Geneva, N.Y.*, xiv., no. 5, October 1921, pp. 415–421, 1 fig. [Received 13th January 1922.]

Anopheles quadrimaculatus occidentalis hibernates in California in the adult stage from about the middle of November. Hibernation is not complete, as the females sometimes change their places of refuge during the winter. They begin to emerge in February, but have practically disappeared by the end of that month. During the emergence flight the area infested is almost always greater than at any other period of the year, many districts being invaded that are free at other seasons. This unusual extent of flight is probably connected with the spread of the species. Females dissected during the winter and at the start of the emergence flight contained half-developed eggs. Those of unfed migrants became mature in about 48 hours after a blood meal in the laboratory, and it appears that the overwintering females lay only a single batch of eggs before they die. The adults arising from these eggs in May and June are relatively few in number. This may be due to the small number of eggs deposited or the exposure of the larvae to predacious enemies during a period prolonged as a result of the low temperature. Eggs are deposited by this generation a few days after emergence. Under laboratory conditions not more than three batches of eggs were ever laid, the total number being 499.

A. quadrimaculatus occidentalis has been successfully controlled in California by directing operations against the larvae after the spring migratory flight of overwintering adults and again in the autumn. By starting the work at a very early date absolute control was obtained by midsummer, and fully half of the sum allotted for this purpose, which was the same as in previous years, remained unspent. The same measures would control *A. punctipennis* and *A. pseudopunctipennis*, should they be found to hibernate in the larval stage.

BARBER (M. A.) & HAYNE (T. B.). **Arsenic as a Larvicide for Anopheline Larvae.**—*Public Health Repts., Washington, D.C.*, xxxvi, no. 49, 9th December 1921, pp. 3027–3034.

The authors confirm the work of Roubaud, who successfully used trioxymethylene in poisoning Anopheline larvae [*R.A.E.*, B, viii, 166, 167]; in endeavouring to obtain some cheaper and more poisonous substance they found compounds containing arsenic most promising, Paris green proving the most effective.

Experiments with trioxymethylene and Paris green—the larvae being allowed to feed for three seconds or less—showed that of ten larvae feeding on the former none were dead sixteen hours after, while four out of nine feeding on the latter died within three hours, and a fifth in less than five. In another series trioxymethylene, lead arsenate and Paris green were compared, the dosage of the first two poisons varying from four to fifteen seconds and that of the latter from two to ten seconds. All larvae fed on trioxymethylene died in less than an hour, those fed on Paris green died within less than two hours, while of the lead arsenate series practically all survived until the next day or later. These experiments showed that though Paris green did not always cause a more rapid death than trioxymethylene, the proportion surviving after a very small dose was less in the case of Paris green than the other poisons ; this is of considerable importance, as it is not always possible to give larger doses when treating a stream or pond. Various laboratory accidents showed the extreme sensitiveness of the larvae to minute quantities of Paris green. It is possible that certain digestive fluids of the larvae act as solvents for Paris green, as this substance freed from the water-soluble portion by long treatment with water was still poisonous. Lead arsenate and arsenic trioxide were much inferior to Paris green, and powered arsenopyrite seemed wholly inert.

Field experiments are described, and the breeding places successfully treated included impounded water with larvae protected by floating wood, cold water in a ditch immediately below a spring, the larvae being protected by thick watercress, ponds covered with grass or *Myriophyllum*, cow tracks in a wet pasture, and an old ditch with water covered with duckweed and partly protected by overhanging weeds. In small pools a few pinches of the diluted Paris green sufficed to destroy the larvae. The species of Anopheline larvae do not differ in their resistance to this poison.

A dilution of about 1 part of the poison to 100 parts of inert dust is a satisfactory mixture. Diluents are fine sand, rotten wood dust, and road dust, the latter mixed with some fine clay being the most effective. The quantity of Paris green to be used depends on the character of the breeding place, and about 10 c.c. to 1,000 sq. feet is recommended. Throwing the dust into the air by hand is the best means of distribution.

The best results are obtained on sunny days. The frequency of treatment depends on the temperature of the water. The cost of the poison and the danger of poisoning the operator or the water are discussed. As regards the latter, only a minute quantity of Paris green is dusted over a very large surface, and of that only a small fraction is water-soluble. The poison had no effect on top minnows or any other aquatic animal, however delicate, other than the surface-feeding Anopheline larvae. The chief disadvantages of the use of arsenic dust is that its use is limited to such larvae, the eggs and pupae of all mosquitos and the larvae of Culicines being apparently unaffected.

Fletcher (T. B.). **Report of the Imperial Entomologist.**—*Sci. Repts. Agric. Res. Inst., Pusa, 1920–21, Calcutta,* 1921, pp. 41–59, 1 table, 6 plates. [Received 18th January 1922.]

A larva of *Haematopota javana,* Wied., was found underground near the roots of indigo. Pupation occurred after ten days, and the adult emerged five days later.

During March 1921 *Tabanus albimedius*, *T. bicallosus* and *Chrysops* sp. were found ovipositing freely on leaves of *Polygonum* along the banks of a river. The eggs of *T. albimedius* were heavily infested with a Chalcid (*Phanarus* sp. ?), the other two species being only lightly infested. The parasites oviposited in the upper and lower layers of eggs, the former producing males and the latter females. The males emerge twenty-four hours before the females. Oviposition occurs soon after emergence. In the laboratory a single female oviposited seven times, but under natural conditions the number of eggs is greater. The life-cycle of the parasite extended to nine days at Pusa, when the incubation period of the eggs of *T. albimedius* was six days.

Larvae of *Aëdes* (*Stegomyia*) *thomsoni*, *A.* (*S.*) *albopictus*, *A.* (*S.*) *gubernatoris*, *A.* (*S.*) *w-alba* and of the Tabanid, *Gastroxides ater*, have been commonly found in tree-holes. Experiments were undertaken with reference to the rôle of blood in ovulation in CULICIDAE. The author having found *Culex vishnui* sucking a Syntomid moth in Ceylon, endeavours were unsuccessfully made to induce *Stegomyia* sp. to feed on living Lepidoptera.

Some observations are recorded on the toxicity of certain chemical substances with reference to the larvae of *A. albopictus*.

Some flies, identified as *Chrysomyia bezziana*, Vill., were reared from larvae extracted from wounds in the soft palate of a patient suffering from this form of myiasis in Pusa.

HUTSON (J. C.). **Report of the Entomologist.**—*Rept. Ceylon Dept. Agric., 1920, Peradeniya*, 1921, pp. C. 15–17. [Received 23rd January 1922.]

The following ticks from cattle in Ceylon were identified in 1920 :—*Hyalomma aegyptium*, *Amblyomma integrum*, *Rhipicephalus sanguineus*, *R. haemaphysaloides*, *Haemaphysalis bispinosa*, and *Boophilus* sp.

WATERSTON (J.). **The Louse as a Menace to Man. Its Life-history and Methods for its Destruction.**—*Brit. Mus.* (*Nat. Hist.*), *London*, Econ. Ser., no. 2, 1921, 20 pp., 1 plate, 2 figs. Price 6*d*.

This pamphlet is intended to replace an earlier one, "The Louse and its Relation to Disease." Part I. deals with the life-histories and habits of the lice found on man—*Pediculus humanus humanus*, L., *P. humanus corporis*, De G., and *Phthirus pubis*, Leach, and their relations with their hosts. Part II. discusses the louse as a vector of diseases, such as typhus, relapsing and trench fevers, plague, the bacillus of which may be accidentally transmitted by lice, and skin affections, such as impetigo, pityriasis, favus, etc. Part III. deals with the destruction of lice by heat or by chemical substances, the former being the cheapest, simplest, and most efficient method.

DE MELLO (F.) & AFONSO (P. C.). **First Entomological Records in Portuguese India.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 43–48.

A list is given of the insects connected with medical entomology.

The mosquitos include *Anopheles subpictus*, Grassi (*rossi*, Giles), *A. stephensi*, List., *A. ludlowi*, Theo., *A. leucosphyrus*, Dön., *A listoni*, List., *A. culicifacies*, Giles, *A. barbirostris*, Wulp, *A. jamesi*,

Theo., *A. pulcherrimus*, Theo., *A. hyrcanus*, Pall. (*sinensis*, Wied.), *A. maculatus*, Theo., *A. fuliginosus*, Giles, *A. vagus*, Dön., *Rachionotomyia aranoides*, Theo., *Culex fatigans*, Wied., *Aëdes argenteus*, Poiret (*Stegomyia fasciata*, F.), and *A.* (*S.*) *albopictus*, Skuse.

HOWARD (L. O.). **Report** [1920–21] **of the Entomologist.**—*U.S. Dept. Agric., Bur. Ent., Washington, D.C.*, 1st August 1921, 33 pp. [Received 24th January 1922.]

In the section of this report dealing with insects affecting the health of man and domestic animals it is stated that attention was given to flies and other insects in meat-packing establishments. A marked improvement in fly conditions has taken place there since 1915, when the work was begun. Screw-worms [*Cochliomyia macellaria*] were the subject of further study on the same lines as previously reported [*R.A.E.*, B, ix, 50], special stress being laid on their destruction under range conditions. In Texas a material reduction is reported in screw-worm cases since fly-trapping began. Experiments to test the toxicity of various chemicals to ox-warble [*Hypoderma*] larvae resulted in the discovery of a very effective ointment, consisting of a mixture of iodine and vaseline. A 100 per cent. destruction of the common species, *Hypoderma lineatum*, can be secured by pressing this ointment into the warble-holes in the backs of cattle. The work against poultry parasites has been more or less along the line of securing the adoption of tested measures already published.

LANGERON (M.). **Deuxième Mission parasitologique en Tunisie, Tamerza (Septembre-Octobre 1919).**—*Arch. Inst. Pasteur Afr. Nord, Tunis*, i, no. 4, December 1921, pp. 347–382, 10 figs.

The mountain oases studied lie between the steppes of central Tunisia and the Sahara proper. Only two Anophelines were observed, *Anopheles hispaniola*, Theo., and *A. culicifacies*, Giles. Though common, they were not troublesome, as horses, rabbits and fowls were present.

The Culicines were *Theobaldia longiareolata*, Macq., *Culex laticinctus*, Edw., *C. apicalis*, Adams, *C. pipiens*, L., and *Uranotaenia unguiculata*, Edw. (larva only). Culicine larvae only develop in water of some depth, whereas Anophelines can exist in much shallower waters. Such waters may cover the sand with a thin sheet more like a sandy, semi-fluid paste than a liquid. Anopheline larvae and pupae can resist strong currents and prevent themselves from being drawn down by the water sinking into the sand. They feed on diatoms, and may also be predatory. *Chara* spp. seem to exercise an influence unfavourable to mosquito larvae only if very abundant [*R.A.E.*, B, viii, 61].

In the author's opinion the larva of a mosquito is a highly specialised organism, and larval characters should be taken into consideration in identification and classification. A discussion of such characters is given for the Anophelines mentioned above, and for *A. multicolor*, Camb., taken by the author at Tozeur, in the southern Djerid region in 1911.

Of the four sand-flies taken in houses, *Phlebotomus minutus*, Rond., was by far the most abundant. The others were *P. fallax*, Parr.,

P. papatasii, Scop., and *P. sergenti*, Parr. The author was bitten by *P. sergenti*, but no data were obtained showing that *P. minutus* or *P. fallax* habitually attack man.

Both males and engorged females were taken of a new species, *Culicoides langeroni*, Kieff.

Cimex lectularius and *Argas persicus* occur, but no trace of *Ornithodorus* could be found.

NICOLLE (C.). **L'Infection par le Virus du Typhus exanthématique est-elle héréditaire chez le Pou ?**—*Arch. Inst. Pasteur Afr. Nord, Tunis*, i, no. 4, December 1921, pp. 433–436.

It has been concluded that the infection of typhus is hereditary in the louse [*R. A. E.*, B, x, 48] as a result of a positive inoculation with the product of ground louse eggs collected on a case of typhus. The author disagrees with this view, as he did when it was originally briefly enunciated [*R. A. E.*, B, ii, 90] and, discussing the detailed statement, concludes that not only is hereditary transmission not proved, but that it is not probable.

BONILLA (A.). **Larvas que atacan el Ganado Lanar.** [Larvae infesting Sheep.]—*Rev. Agric., San Jacinto, Mexico*, vi, no. 9, January 1922, p. 531.

The larvae of *Oestrus ovis* infest the frontal sinuses of sheep. *Lyperosia irritans* (*Haematobia serrata*) attacks cattle, generally at the base of the horns, but exceptionally it also attacks sheep. As the larvae live in cattle dung, where they develop in two or three weeks, and as the insect has seven or eight generations in a year, cattle sheds should be kept clean and disinfected with creolin.

BAGUÉ (J.). **La Piroplasmosis o Fiebre de Tejas.**—*Porto Rico Insular Expt. Sta., Rio Piedras*, Circ. 45, August 1921, 5 pp. [Received 27th January 1922.]

Texas fever has been indigenous in Porto Rico for a very long period, and the native cattle have acquired a high degree of immunity, but foreign cattle, which are imported in large numbers, suffer greatly from the disease. Treatment of the animals has not given satisfactory results, and it is realised that the only reliable method is the extermination of ticks that transmit the disease ; the value of arsenical dips in this connection is discussed.

YAKIMOFF (W. L.) & WASSILEWSKY (W. J.). **L'Identification du Trypanosome des Chameaux du Turkestan et de l'Oural.**—*Bull. Soc. Path. Exot., Paris*, xiv, no. 10, 14th December 1921, pp. 637–638.

Experiments here described show that the trypanosome of camels in Turkestan is identical with that of camels in the Ural. It is probable that the Astrachan form is also the same.

Yakimoff (W. L.). **A Propos de l'Identification du Trypanosome des Chameaux du Turkestan russe.**—*Bull. Soc. Path. Exot., Paris,* xiv, no. 10, 14th December 1921, pp. 638–640.

Investigations were made with the object of ascertaining whether the trypanosome in Turkestan camels is the same as the other known camel trypanosomes, *Trypanosoma evansi* (surra) and *T. soudanense* (debab of northern Africa). The conclusion is reached that the species found in Turkestan and the Ural is a distinct one, and the name *Trypanosoma ninae* is proposed for it.

Franchini (G.). **Sur les Flagellés intestinaux du Type** *Herpetomonas* **du** *Chamaeleon vulgaris* **et leur Culture, et sur les Flagellés du Type** *Herpetomonas* **de** *Chalcides* (*Gongylus*) *ocellatus* **et** *Tarentola mauritanica*.—*Bull. Soc. Path. Exot., Paris,* xiv, no. 10, 14th December 1921, pp. 641–645.

Records are given of the occurrence of *Herpetomonas* and other flagellates in the digestive tract of chameleons, lizards and geckos.

Marchoux (E.). **Le Paludisme en Corse y est Fonction de la Misère.**—*Bull. Soc. Path. Exot., Paris,* xiv, no. 10, 14th December 1921, pp. 654–658.

The author points out that malaria in Corsica has increased since the war owing to the internment there of German prisoners (who were very susceptible to infection and gave new life to the old foci) and to the increase of poverty among the inhabitants.

Sergent (Ed.) & Sergent (Et.). **Les Facteurs sociaux de la Décroissance du Paludisme.**—*Bull. Soc. Path. Exot., Paris,* xiv, no. 10, 14th December 1921, pp. 658–662.

The authors agree with Marchoux that malaria decreases with an increased prosperity of the population affected. The eradication of Anophelines is not necessary for assuring perfect health conditions; there are as many larvae of *Anopheles maculipennis* in Brittany and in and around Paris as in the most fever-stricken districts of Algeria, Corsica or Macedonia. Better food, clothing and shelter constitute important factors, besides those represented by changes in local conditions due to agricultural progress.

Roubaud (E.). **Le Bien-être dans le Paludisme et les Maladies à Trypanosomes.**—*Bull. Soc. Path. Exot., Paris,* xiv, no. 10, 14th December 1921, pp. 662–665.

Whilst admitting that prosperity in a community is a very important factor in minimising the effect of malarial infection, the author does not agree with the view that prosperity alone will lead to the disappearance of malaria in a region where it is endemic. The influence of prosperity in the apparent regression of the disease, *i.e.*, the attenuation or even the more or less permanent absence of morbid symptoms, is also clearly shown in trypanosome infections. Physiological poverty

is the main reason of the high mortality in man in the Congo due to trypanosomiasis. The small cattle of those regions of French West Africa where *Glossina morsitans* occurs also supply a very good instance of this. The infection is latent in these native cattle because they are allowed to live and pasture without restraint, and therefore remain in good condition. The same breed suffers in districts where food remains plentiful but water is scarce, so that the physiological equilibrium is disturbed. In eastern Africa domesticated zebra die of trypanosomiasis, whereas they occur in a wild state in tsetse-fly regions. Prosperity then remains a palliative, but cannot definitely destroy the pathogenic influences when the external conditions of their spread by insect agency are not modified.

The extinction of malaria in France is due, in the author's opinion, to the change in the feeding habits of Anophelines owing to the increase of cattle and the permanent practice of keeping them under cover. Without the "cattle factor" the drainage works would have proved insufficient. If the great drainage works in Corsica had been supplemented by an agricultural development leading *Anopheles* to attack cattle instead of man, malaria would not be the danger it is at present.

SERGENT (Ed.), SERGENT (Et.), PARROT (L.) & DONATIEN (A.). **Le Paludisme en Corse. Etude épidémiologique.**—*Bull. Soc. Path. Exot., Paris*, xiv, no. 10, 14th December 1921, pp. 685–710, 2 maps.

This is a report of an investigation on malaria in Corsica made in 1921, in autumn, the most malarious part of the year.

Anopheles maculipennis, the only species met with, is abundant everywhere, and was found to have a sporozoite index of 1·2 per cent. The most dangerous breeding places are in the marshes, river beds, and badly kept irrigation and drainage canals in the eastern plain, and in all running waters found in the other parts of the island, even in the mountains, provided that plants and stones check the current.

The salt lagoons on the coast of the eastern plain do not harbour the Anopheline because their central portions are deep, teem with fish, and contain no grasses, while their shores are maritime in character. The reservoir of the virus is quite as important as ten years ago. Taking the whole island, the children have a spleen index of 23·8 per cent. and a plasmodic index of 14·7 per cent. If the population of the eastern plain only is considered, they have a spleen index of 39·9 per cent. and a plasmodic index of 26·2 per cent.

BAGNALL (R. S.). **The Siphonaptera (Fleas) of Northumberland and Durham.**—*Trans. Nat. Hist. Soc., Northumberland, Durham and Newcastle-upon-Tyne, London*, N.S., v, pt. 2, 1921, pp. 181–198. [Received 30th January 1922.]

Much useful information is collected in this paper, which discusses existing literature on fleas, and the investigations that revealed the part played by these insects in the transmission of bubonic plague, with notes on the life-cycle and rearing of fleas and their distribution. A list of British fleas is given, 32 out of the 45 known species being found in Northumberland and Durham. Records are included of the local fleas and their hosts, and short notes are given on the species that have not yet been recorded from the district.

FRY (A. B.). **The Rôle of Cattle in the Epidemiology of Malaria.**—*Ind. Med. Gaz., Calcutta*, lvii, no. 1, January 1922, pp. 1–2.

The conclusions of other authors with regard to the rôle played by cattle in the prevention of malaria are briefly reviewed, and coincide with the author's views, expressed in 1914, regarding the extremely low percentage of malaria infection among the population of Bengal, where the sleeping apartments in houses are clean and well kept, while the cowsheds near may be swarming with Anophelines. In Ross's mathematical formula of the epidemiology of malaria, the chief factor is the proportion of mosquitos that succeed in biting human beings, and this factor must certainly be influenced by the presence of cattle. It has been pointed out that close association with cattle does not always prevent a human epidemic of malaria ; in the Punjab epidemic of 1908 the cattle zone of Amritsar city was one of the worst epidemic areas. It is quite understandable, however, that the presence of cattle may act as a twofold weapon, and attract mosquitos even while it protects human beings that are outside the actual cattle zone. Many of the villages in the endemic areas of Bengal are built on high ground surrounded by swamps ; it is suggested that if the cowsheds were arranged in a ring on the outskirts of the village, with dwelling-houses in the centre, instead of indiscriminately, as is the usual plan, the population would be far less troubled by mosquitos than they are at present.

ADIE (H. A.). **Kala-azar Inquiry of the Indian Research Fund Association.**—*Ind. Jl. Med. Res., Calcutta*, ix, no. 3, January 1922, p. v.

The finding of Leishman-Donovan bodies in the salivary glands and ducts of *Cimex rotundatus* taken on the bed of a suspected kala-azar case in the infected area is announced from Assam. This discovery proves that this bed-bug is able to transmit the disease by biting.

CHRISTOPHERS (S. R.) & CRAGG (F. W.). **On the so-called "Penis" of the Bed-Bug** (*Cimex lectularius*, **L.**) **and on the Homologies generally of the Male and Female Genitalia of the Insect.**—*Ind. Jl. Med. Res., Calcutta*, ix, no. 3, January 1922, pp. 445–463, 3 plates.

The contents of this paper are indicated by its title.

PATTON (W. S.). **Some Reflections on the Kala-azar and Oriental Sore Problems.**—*Ind. Jl. Med. Res., Calcutta*, ix, no. 3, January 1922, pp. 496–532, 6 plates.

As the literature on kala-azar is so extensive and is written in so many languages, the student has to depend on current reviews for information of what other workers are doing. There is an urgent need for a critical summary of all the work which has been done on the etiology of this disease and of oriental sore in different parts of the world. The author hopes to publish such a summary in due course.

This paper is not intended, therefore, to be a review, but only some thoughts and reflections on the subject, with which he has been chiefly concerned during the last few years.

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Cornwall (J. W.) & La Frenais (H. M.). **A Contribution to the Study of Kala-Azar (V.).**—*Ind. Jl. Med. Res., Calcutta*, ix, no. 3, January 1922, pp. 533–544, 5 figs.

As the findings of Mrs. Adie differed greatly from those of the present authors [*cf. R A.E.*, B, ix, 209] it was decided to repeat some of the previous work [*R. A.E.*, B, iv, 124, 174; v, 124; vi, 207]. The technique employed during these observations is described. In no case was any evidence of an intracellular stage of development of the parasite of kala-azar found in the bed-bug. On a few occasions single bodies that were indistinguishable from forms of the parasite were noticed in cells, but they may have been parasites in the cells or artefacts. Since the flagellates can multiply so freely in the contents of the stomach and gut, it is thought there is no need for an intracellular stage; but the mere facts of flagellation and multiplication do not suggest an explanation, in the circumstances, of the use of the flagellum to the parasite, nor the use of free multiplication in promoting the continuity of its life-cycle.

The presence of an obligatory intracellular phase would form strong evidence in favour of the bug being the true insect vector of Indian leishmaniasis, but if it is absent the bug should only be considered as a casual host in which the parasite can only develop to a certain point.

Although it may be argued that the experiments described are not quite natural, as the bugs were fed on cultures and not on infected persons or animals, the authors are quite satisfied as to the results.

No positive intracellular development was obtained from oriental sore experiments, although these were nearer natural conditions than those referred to above. It is suggested that some other possible vector be carefully investigated in connection with the transmission of leishmaniasis.

Patton (W. S.). **Some Notes on Indian Calliphorinae. Parts II.–V.**—*Ind. Jl. Med. Res., Calcutta*, ix, no. 3, January 1922, pp. 548–574, 4 plates, 2 figs.

Lucilia argyricephala, Macq. (*serenissima*, F.), is widely distributed in India, and is met with at altitudes of 6,000 ft. It is commonly found in bazaars, but never enters houses. Oviposition occurs on fresh meat, entrails and offal of all kinds, also in the bodies of freshly killed birds, and to some extent in decomposing matter. This species is attracted to shed blood, and can easily be bred by placing females in cages with some fresh meat. It rarely produces myiasis, and then only in animals. The larvae have only been recovered from three cases, all of which occurred in the Bombay Presidency. Owing to the structure of the larvae, they are not well adapted to live in the tissues of man or animals.

This species is commonly infected with the flagellates, *Rhynchoidomonas luciliae* in its Malpighian tubes, and *Herpetomonas mirabilis* and *H. muscae-domesticae* in its alimentary tract. The latter parasite obtained from this fly has never developed into a *Rhynchoidomonas*, though it has been cultured for months.

Lucilia craggi, sp. n., is very similar in its habits to the European blow-flies *Calliphora erythrocephala* and *C. vomitoria*. It occurs

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in the Palni, Shevaroy, and Nilgiri Hills. The female is attracted by the smell of food, especially meat, and readily oviposits on stale cooked or uncooked meat. In nature it breeds in the dead bodies of birds and small animals, its larvae being most efficient scavengers. Both sexes are commonly infected with *Herpetomonas mirabilis* and *H. muscae-domesticae.*

Chrysomyia megacephala, F. (*dux,* Esch.) occurs throughout India, Burma, Assam and Ceylon, and has recently been found by Froggatt in the New Hebrides. It is also recorded from Guinea and Java. It is primarily a necrophagous fly, and breeds in a variety of foodstuffs, but chiefly in decomposing animal matter. It apparently only occasionally lays eggs on diseased tissues of animals. Both sexes are commonly infected with *H. mirabilis* and *H. muscae-domesticae.*

Chrysomyia nigriceps, sp. n., rarely enters houses, breeding chiefly in dead bodies of birds and small animals. It has been taken at an elevation of about 2,000 ft.

C. albiceps, Wied., apparently only breeds in animals after decomposition is well advanced; *C. rufifacies,* Guér., from Australia, is identical with it. It is suggested that the habit of ovipositing in soiled wool, as recorded from Australia, may have been acquired as a result of the abundance of other larvae, which would form the normal food for the third stage larvae of *C. albiceps.*

C. villeneuvei, sp. n., has only been found by the author in Coonoor. The breeding habits have been observed by laying out decomposing bodies of rabbits as baits. The eggs are laid in small batches among the eggs of other CALLIPHORINAE, and the second and third stages feed on the larvae of other blow-flies and those of *Sarcophaga* sp.

The distribution of *Lucilia pulchra,* Wied. (*ruficornis,* Macq.) in India is not known. It appears to be essentially a flower and fruit juice feeder, the females being commonly found at Coimbatore in July, feeding on the fruit of the Neem tree.

Lucilia ballardi, sp. n., is widely distributed in South India, and is frequently seen feeding on human excrement. The eggs are apparently only laid in decomposing animal matter.

All the stages of the various species dealt with are described.

SINTON (J. A.). **Entomological Notes on Field Service in Waziristan.**— *Ind. Jl. Med. Res., Calcutta,* ix, no. 3, January 1922, pp. 575–585.

The following species of *Phlebotomus* were captured in the Waziristan area during the summer and autumn of 1919 and the spring of 1920: *P. papatasii, P. minutus, P. minutus* var. *antennatus* and *P. sergenti. P. papatasii* seems the most common species in the early part of the year, and *P. minutus* in the autumn, though further observations are necessary to confirm this. Individuals of *P. papatasii* were first taken on 8th March, and soon afterwards became very numerous. Within a few days of the first recorded appearance of *Phlebotomus,* cases of sand-fly fever began to occur. *P. papatasii* occurs in greater abundance in cowsheds, while in human habitations *P. minutus* appears to be the predominant species.

P. sergenti has now been recorded from Algeria, Mesopotamia, the Caucasus, Persia, the North-west Frontier of India and Lahore, all of which are places where oriental sore is prevalent.

The Anophelines recorded from Waziristan are: *Anopheles pulcherrimus*, *A. culicifacies*, *A. stephensi*, *A. subpictus* (*rossi*), *A. fuliginosus*, *A. listoni*, *A. turkhudi*, *A. rhodesiensis*, *A. nursei* and *A. maculipalpis*.

IYENGAR (M. O. T.). **A Note on Grappling Tail-hooks in Anopheline Larvae.**—*Ind. Jl. Med. Res., Calcutta*, ix, no. 3, January 1922, pp. 630–633, 2 plates.

The above-mentioned organs are present in the following species: *Anopheles subpictus*, Grassi (*rossi*, Giles), *A. vagus*, Dön., *A. culicifacies*, Giles, *A. fuliginosus*, Giles, *A. jamesi*, Theo., *A. maculipalpis*, Giles, *A. maculatus*, Theo., *A. minimus*, Theo., *A. listoni*, List., *A. stephensi*, List., *A. barbirostris*, Wulp, *A. hyrcanus*, Pall., and *A. gigas*, Giles.

By means of these hooks, the larvae breeding in stagnant waters hang on to the roots of floating vegetation when disturbed, and those breeding in running water cling to boulders on the sides of streams.

FLU (P. C.). **Tests re the Period in which** *Stegomyia fasciata* **can live at Low Temperatures.**—*Meded. Burg. Geneesk. Dienst Ned.-Indië, Batavia*, 1920, vii, pp. 99–105. (Also in Dutch.)

The subject matter of this paper on the resistance of *Aëdes argenteus*, Poiret (*Stegomyia fasciata*, F.) to the low temperatures of cold storage chambers on ships is the same as that of one noticed from another source [*R. A.E.*, B, viii, 202].

HOESEN (H. W.). **Rat-plague Indicators in Java.**—*Meded. Burg. Geneesk. Dienst Ned.-Indië, Batavia*, 1920, viii, pp. 2–89. (Also in Dutch.)

As a result of investigations in Java Swellengrebel stated that a certain relation seemed to exist between the increase of fleas in a given district and the occurrence of rat plague there [*R. A.E.*, B, i, 88]. Whether this relation actually exists or not is a question of importance, an affirmative reply providing a rapid means of proving the existence or non-existence of rat plague. There are three "indirect" indicators of rat plague, viz., the flea-index; the percentage of flea-carrying rats; and the relative percentage of such rats and those carrying trypanosomes and being shorter than 151 mm. (*i.e.*, young animals not yet immune against trypanosomiasis). With an outbreak of rat plague the percentage of the former would increase, owing to the concentration of fleas on the living rats, while that of the latter would remain constant, as the infection with *Trypanosoma lewisi* appears only after a week or two, and the rats would have died of plague long before that, while both parasites are chiefly carried by fleas. These indirect indicators had to be compared with the "direct" indicators, viz., the occurrence of cases of human plague or the discovery of infected rats and fleas. Investigations with this object in view are described in detail.

It does not appear possible in Java to decide merely by reason of the value of the indirect indicators whether the epizootic is occurring or not, though it may be possible to diagnose rat plague on indirect lines by means of a method (described here) of grouping the figures from the flea-index and the percentage of flea-carrying rats.

BONNE-WEPSTER (J.) & BONNE (C.). **Surinaamsche** *Anopheles*-**soorten.** [*Anopheles* of Surinam.]—*Geneesk. Tijdschr. Ned.-Indië, Batavia*, lxi, no. 6, 1921, pp. 673–679, 1 plate.

The authors record the following species of Anophelines from Surinam :—*Anopheles* (*Cellia*) *argyritarsis*, R.-D. ; *A.* (*C.*) *tarsimaculatus*, Goeldi ; *A.* (*Manguinhosia*) *peryassui*, D. & K. ; *A.* (*Chagasia*) *fajardi*, Lutz ; *A.* (*Arribalzagia*) *apicimacula*, D. & K. ; *A.* (*A.*) *mediopunctatus*, Theo. ; *A.* (*Stethomyia*) *nimbus*, Theo. ; *A.* (*Dendropaedium*) *hylephilus*, D. & K. ; and *A. eiseni*, Coq.

Flu described a species under the name *Anopheles lutzi*. This name was also used by Cruz for one species, while Theobald used it for another, and, furthermore, gave the same specific name to a third *Anopheles* in another sub-genus. These three species are now shown to be respectively *Anopheles* (*Myzorhynchella*) *lutzi*, Cruz, *A.* (*Dendropaedium*) *cruzi*, D. & K., and *A.* (*Manguinhosia*) *peryassui*, D. & K. Flu's species does not resemble any of these ; it most resembles *A.* (*Arribalzagia*) *apicimacula*, D. & K.

Keys to the larvae and adults of the above nine species are given.

A. argyritarsis, R.-D., is widely distributed inland ; it breeds in forest pools abounding in algae, and seems very particular in the choice of breeding-places. Hitherto the authors have never found it in artificial collections of water, though there are reliable records of such occurrence in the literature. The adults abound in dark places inside houses inland. No other species in Surinam has such a preference for sheltering indoors. *A. tarsimaculatus*, Goeldi, is the commonest species. It breeds in pools in forests and meadows, in rice-fields, etc. In the evening, and sometimes by day, it enters houses, but does not shelter there so readily as *A. argyritarsis*. *A. peryassui*, D. & K., was captured once only ; it attacks man. *A. fajardi*, Lutz, is a true forest species. *A. apicimacula*, D. & K., is widespread on the coast and inland, but much rarer than *A. tarsimaculatus*. It breeds in small forest pools, and sometimes enters houses, but usually leaves them again. This is also true of *A. mediopunctatus*, Theo., and *A. nimbus*, Theo. The larvae of *A. hylephilus*, D. & K., were found in water collected in Bromeliaceae. *A. eiseni*, Coq., is widespread inland. It breeds in pools in dry creek beds and attacks man in the evening, but was never seen indoors.

A. argyritarsis and *A. tarsimaculatus* play the chief rôle in the transmission of malaria.

MARTINI (E.). **Ueber ein gutes Unterscheidungsmerkmal von** *A. plumbeus* **und** *A. bifurcatus*. [On a good differentiating Character between *A. plumbeus* and *A. bifurcatus*.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic*, xxv, no. 12, December 1921, pp. 364–365.

In the female of *Anopheles plumbeus* the fourth and fifth palpal joints are smaller than the second, whereas in *A. bifurcatus* they are larger. The two terminal palpal joints are also somewhat thicker in *A. plumbeus* than in *A. bifurcatus*.

VEITCH (R.) & GREENWOOD (W.). **The Food Plants or Hosts of some Fijian Insects.**—*Proc. Linn. Soc. N.S.W., Sydney*, xlvi, part 4, no. 184, 23rd December 1921, pp. 505–517.

The insects dealt with include several lice, fleas and blood-sucking Diptera, as well as the mosquitos *Culex fatigans*, Wied., *C. jepsoni*,

Theo., *C. nocturnus*, Theo., *Finlaya poicilia*, Theo., *Aëdes argenteus*, Poir. (*Stegomyia fasciata*, F.), *S. pseudoscutellaris*, Theo., and *Taeniorhynchus brevicellulus*, Theo.

EVANS (W.). **An Anopheline Mosquito in East Lothian.**—*Scottish Naturalist, Edinburgh*, no. 119–120, November–December 1921, pp. 185–186.

Anopheles plumbeus, Steph., is recorded from East Lothian, apparently for the first time.

SEN (S. K.). **A Note on the Effect of Mercurous Chloride on Culicid Larvae.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 184–191, 2 plates.

During experiments to test the effect of various salts on the larvae of mosquitos, some results were obtained with calomel (HgCl), which seems to offer possibilities as a larvicide against mosquitos, in view of the desirability of replacing kerosene (until now practically the only larvicide in use) by a more convenient and less expensive material. The results of the tests are shown by means of graphs, and present considerable discrepancies. These may be due to a debilitated condition of the larvae at the time of the experiments, or to the fact that death is dependent on the extent to which the salt particles are distributed over the surface of the water, or they may be the result of variation in atmospheric temperature. It was noticed that larvae experimented with in June and July died more quickly than those dealt with in November. The slight solubility of calomel, together with the fact that an exceedingly minute quantity of the salt is necessary to kill the larvae, while having no effect on the human system, renders it quite safe for treatment of drinking water in ponds, etc. The transitory nature of the effect of kerosene, however violent its immediate action, imposes severe limitations on its practical value as a larvicide, as it involves continuous replenishment in any collection of water, whereas the action of calomel, though slow and unsteady, is generally sure, while its cost is about one-fourth that of kerosene.

Calomel has, however, two serious drawbacks: firstly, it generally fails to kill the larvae [*sic*, ? pupae], and, secondly, it would be difficult to keep the salt particles floating for any considerable period. Its superiority over the other halogen salts of mercury lies in its cheapness and the fact that the soluble salts are apt to form precipitates with the alkaloidal and other constituents of various kinds of vegetation likely to occur in the breeding-places of mosquitos. Over kerosene its great advantage is that it is not inflammable.

The larvae experimented with were those of *Aëdes* (*Stegomyia*) *albopictus*; tests with Anophelines have not yet been made.

SHARMA (H. N.) & SEN (S. K.). **Oviposition in Culicidae.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta*, 1921, pp. 192–198, 5 plates.

These experiments with *Culex fatigans*, *C. vishnui* and *Aëdes* (*Stegomyia*) *albopictus* were conducted with the object of determining whether choice of water for oviposition is influenced in these mosquitos by the condition of the water as regards temperature, osmotic pressure and surface-tension, and whether their choice can be influenced by the addition of small quantities of sweet, salt, astringent or alkaline

substances to the water. The apparatus and technique employed are described.

In the experiments based upon taste, the largest number of eggs was laid on 0·6 per cent. solution of common salt, while very few were laid on an equimolecular solution of sugar, though the preference of the adult mosquito in captivity for solutions of sugar is well known. For oviposition a salt solution of low strength appears to be preferred even to distilled water, the strength being considerably below 1 per cent. A list is given of certain organic salts that always gave better results than their corresponding acids. The results are also recorded with certain inorganic acids acting against an alkali and with certain well-known disinfectants, and with vegetable products, such as mannite and asparagin.

As regards temperature, it would appear that at from 73° to 95° F. almost all the species of mosquitos experimented with—the notable exception being *Anopheles subpictus* (*rossi*)—preferred the highest temperature.

SHARMA (H. N.). **A Preliminary Note on the Action of Acids, Salts and Alkalies on the Development of Culicid Eggs and Larvae.**—*Rept. Proc. 4th Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 199–204, 1 plate.

The chemicals used in these tests to ascertain their relation to the development of eggs and larvae of Culicids included a number of acids, salts and alkalies, some of which were chosen with regard to their occurrence in natural breeding-places, while others had reference to their larvicidal properties. The interesting facts regarding the behaviour of these chemicals towards Culicid eggs and larvae are recorded merely as giving some clue to possible lines upon which future investigations might profitably be pursued. The eggs employed were those of *Culex fatigans,* this being the commonest domestic mosquito, and the results of the tests are shown in a series of tables and a graph.

Of those substances in which the life-cycle was completed, the quickest larval development took place in sodium tartrate 0·5 per cent., the slowest in potassium chloride, and the average development in water, potassium citrate 0·5 per cent. and salicylic acid 0·001 per cent. It is significant that the substances in which the eggs did not hatch, or the larvae died soon after hatching, include some of those in which the least number of eggs were laid according to the records given in the preceding paper, namely, among acids, citric, oxalic, malic, lactic, sulphuric and hydrochloric, and among alkalies, caustic potash and caustic soda ; while the largest number of eggs was laid in sodium tartrate, which seems to be well adapted to hastening larval and pupal development. The toxicity of potassium hydroxide proved far greater than that of sodium hydroxide of the same strength.

CHRISTOPHERS (S. R.). **The Distribution of Mosquitos in Relation to the Zoogeographical Areas of the Indian Empire.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 205–215, 1 plate.

This paper is supplementary to the author's " Revision of the Nomenclature of Indian Anophelini " [*R. A. E.*, B, iv, 74]. Following Blandford's plan of a zoogeographical division of India, largely based upon the distribution of mammals, the country is considered under

six definite subdivisional areas, based on the distribution of Anophelines. These are the Indo-Gangetic, Trans-Indus, Malabar, Peninsular, Assam-Burma, and Himalayan areas, for each of which the Anopheline fauna is listed. Broadly speaking, two types of Anopheline fauna are distinguishable in the Indian Empire, the first occurring in the Indo-Gangetic tract, the Deccan and, to some extent, in the Peninsular area generally ; the second in the countries east of Calcutta and the Malabar tract, with Ceylon and possibly, to some extent, the coastal and hill areas of the Madras tract. It is remarkable that it is chiefly in the degree of absence of Malayan forms that these differ. It seems legitimate to say that the Indian area is characterised by an impoverished Malayan Anopheline fauna, the impoverishment reaching a high degree in the first series of tracts and being but little marked in the second. Of 45 African species only four are common to Africa and India, while of 32 Malayan species 21 are common to Malaya and India ; 32 additional species are Indian only. Certain Indian species seem to have a zoocentre included in the Indian Empire, and these help to make good the impoverishment of Malayan forms in a large part of the area. These species often have a westerly tendency of occurrence ; for example, *A. stephensi*, unrecorded in Malaya, stretches to the confines of the Arabian desert, and *A. culicifacies*, a dominant Indian form not recorded from Malaya, occurs as far westward as Arabia and Palestine. More strictly Indian still are *A. theobaldi*, *A. willmori* and *A. fowleri*.

With regard to the Himalayan species, *A. gigas* is Malayan, and has been found in Java and probably in the Philippines. The common and ubiquitous Himalayan form is *A. lindesayi*, which appears not to be known out of India. Two other species occurring in the Himalayas, and not elsewhere in India, are the two tree-breeders, *A. barianensis* (Holarctic) and *A. annandalei* (Malayan). The Himalayan fauna also occurs at high levels in the Assam and Peninsular areas.

The distribution of Indian Culicids other than Anophelines is also briefly discussed. Of 142 African and European species, 12 only occur in India, and of these some are very widely-distributed, such as *Aëdes argenteus* (*Stegomyia fasciata*) and *Culex fatigans*. But of 161 Malayan species, 56 occur in Malayo-India and at least 10 in Hindustan. Of 95 species recorded from Malayo-India, 40 only are at present not recorded from Malaya. At least 22 of these species are found also in Hindustan. Though not to be considered as strictly accurate, these figures indicate that the rich fauna of moist, tropical Malaya is still found in forests and moist jungles wherever they occur in India, while in the relatively drier parts of India this heavy jungle fauna largely disappears, leaving chiefly the swamp-breeding, agrarian and domestic forms.

In the case of the mosquito fauna of India, one can trace the eastward recession, due to drier climatic conditions, of a faunal area which once extended from Europe to the East. There is, however, much in the distribution of mosquitos due to special circumstances affecting individual species. The explanation of the area of distribution of certain species is not clear, yet these must have a definite significance. It is not understood why some species stop at the Indus, nor why, for example, *Anopheles stephensi* should occur up the Tigris and Euphrates, while *A. culicifacies* does not.

Further knowledge in regard to the Central Asian border is most desirable, as also are observations and collections from the Thibetan and Chinese borders.

Iyengar (M. O. T.). **A Preliminary Note on New Thoracic Appendages in Anopheline Larvae.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 216–218, 1 plate.

A paired contractile appendage has been observed on the dorsal anterior region of the thorax of *Anopheles* larvae, the structure, position and movement being described in this paper. The 10 Indian species of *Anopheles* that have been examined all have these appendages, and also *A. maculipennis* and *A. bifurcatus* from England. Other Culicids that have been studied, such as *Culex, Stegomyia, Armigeres* and *Toxorhynchites* spp., show no trace of them, so that it seems probable that they are characteristic of Anopheline larvae. Further work is being done on the anatomy, homology and function of these appendages, which are not yet understood. They have not been observed before the second instar.

Fletcher (T. B.). **Traps for Mosquitos.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp 219–221, 2 plates.

The fact that mosquitos hide during the daytime in dark situations has suggested some methods of utilising this habit to trap and destroy them. The Watson trap is described, and also an improved type designed by the author. In this a wooden skeleton of a box with a hinged lid is covered all over with mosquito netting. This skeleton box is contained inside an open-topped wooden box painted black inside. At night the hinged top of the inner box is left open, and in the morning, when the mosquitos have settled down, the hinged lid is closed and fastened. The mosquitos within can easily be killed by setting the inner box on the bare ground in blazing sunshine, which will kill them in a few minutes. When the air is damp, this is not so successful, but ants will quickly get inside the box and devour the inmates. In very wet weather a little benzine or petrol might be poured into the double box and the fumes kept in with a piece of cardboard.

An obvious improvement on this would be a mechanical trap requiring only occasional attention. This has been tried by placing sloping glass slips in a dark box in such a position that the mosquitos readily enter but cannot find their way out again. This type has not as yet given much success, but it is hoped to perfect it. Dark blue may prove a more attractive colour than black.

Fletcher (T. B.) & Senior-White (R. A). **Surra and Biting Flies: a Review.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 222–235, 1 map.

Having collected a mass of scattered papers for the purpose of preparing a report on the present situation with regard to surra for the Surra Committee appointed by the Government, the authors here give a résumé of what is actually known and what has actually been done on this subject, which is an important one, especially in north India. The work of many investigators is briefly reviewed. Much still requires to be done on the question of surra in India, definite knowledge being needed regarding the biting flies concerned and the normal method of transmission of the disease. Present knowledge of Indian Tabanids is very defective; a thorough survey of these and other biting flies is requisite, and an adequate staff of regular workers would be necessary to carry the work out thoroughly.

SENIOR-WHITE (R. A.) & SEN (S. K.). **Further Notes on the Occurrence of Coleoptera in the Human Intestine.**—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 236–239.

Further cases are reported of Coleopterous infestation of the human intestine [*R. A. E.*, B, viii, 160], the species in question being almost undoubtedly *Onthophagus bifasciatus*, as in the previous records, or a similar Coprid beetle. The possibilities of introduction through the mouth or per anum are discussed, and the importance of keeping watch for discovery of the larval or pupal stages at post-mortem examinations is emphasised.

In the discussion following this paper, it was pointed out as significant that only adult beetles have been found so far, and also that out of seven individuals recorded no less than six are females. If these had bred in the intestine, a more equal distribution of the sexes would have been expected. It is also suggested that the infestations have only been noticed in the hot and damp areas of the plains, where the bodies of the persons affected are likely to be left at night unprotected by any covering. Further statistics are necessary regarding frequency of occurrence and experiments as to causation.

PATEL (P. G.). **Note on the Life-history of** *Culicoides oxystoma*, **with some Remarks on the Early Stages of** *Ceratopogon*.—*Rept. Proc. 4th Ent. Meeting, Pusa, February 1921, Calcutta,* 1921, pp. 272–278, 1 plate.

Several genera of CERATOPOGONINAE are known in India ; of these, *Culicoides* and, to a lesser extent, *Ceratopogon* are the most important as regards their attacks on vertebrates. All the known species of *Culicoides* generally feed upon warm-blooded animals, including man, while *Ceratopogon* spp. seem to prefer to bite cold-blooded animals, such as caterpillars, snails, earthworms, spiders, lizards, etc. The species of the latter genus breed in kitchen refuse, algal and fungous growths, rotten fruits, under fallen damp leaves, the bark of trees, etc. Some species are purely terrestrial and breed in moist earth, while others are purely aquatic, breeding in both running and still water.

Culicoides spp. seem to be entirely water breeders. The life-history of *Culicoides oxystoma* in confinement is described ; the egg stage lasts 3–11 days, the larval stage 2–10 weeks, and the pupal stage 3–7 days. The life of the adults is probably about one month. They can survive without food for 50–60 hours in hot weather and for 3–4 days in the cold season.

Midges of this genus occur throughout India ; in Assam and Bengal some species are very common more or less throughout the year, and are troublesome to man and animals during the late evening hours. During the hottest hours they are active in shady places. They apparently feed on mammals, and seem to prefer horses, cattle, buffalos and goats. After feeding, *C. oxystoma* generally rests near its host on a wall or other convenient object, usually about five feet from the floor. It has been observed breeding in a drain of sluggish water, reproduction continuing throughout the year, but being most profuse during the hot and wet season. It has also been found breeding in the algae in overflow water near the well of a stable. The author is of opinion that the selection of hosts by this and several other blood-sucking insects is closely associated with the nature of

the materials in which they breed. Much fuller knowledge is required of the factors that determine the limits of selection of hosts in these midges, and further work in connection with the relation between the larval and adult food will prove of immense value in solving the problem of control. Their bite has a most irritant effect, and it is quite possible that they may be the medium for the transmission of some disease.

SURCOUF (J.). **Note sur les Diptêres piquers (Tabanidae) recueillis au Laos par M. Vitalis de Salvaza.**—*Bull. Soc. Ent. France, Paris,* no. 19, 14th December 1921, pp. 285–287.

The following new species are recorded from French Indo-China: *Tabanus euphanes, T. hypomacros, T. salvazai, T. oknos* and *T. ictericus.*

METALNIKOW (S.). **La Mort stérile des Chenilles infectées.**—*C.R. Hebdom. Acad. Sci., Paris,* clxxiv, no. 3, 16th January 1922, pp. 202–204.

From recent observations it is evident that the same micro-organisms may produce different conditions in the larvae of *Galleria mellonella.* Those infected with a very virulent cholera vibrio, although receiving only a small dose, succumbed in from 10 to 15 hours as a result of marked septicaemia. Those infected with a less virulent strain (Cholera asiat. S.) showed a different reaction. Similar results were also obtained with staphylococcal infections.

Although the organisms became entirely enveloped by the phagocytes, practically no normal leucocytes were left, but the blood of the dead caterpillars proved to be sterile, *i.e.,* it did not contain any free organisms.

KUDO (R.). **Studies on Microsporidia parasitic in Mosquitoes. II. On the Effect of the Parasites upon the Host Body.**—*Jl. Parasitology, Urbana, Ill.,* viii, no. 2, December 1921, pp. 70–77, 1 fig.

The previous records of Microsporidia in mosquitos are reviewed, and the geographical distribution of these parasites is given. The North American species dealt with are *Thelohania magna* infesting *Culex restuans (territans), T. illinoisensis* in *Anopheles quadrimaculatus,* and *T. opacita,* sp. n., in *Culex apicalis.*

The effect upon the host is apparently fatal, and the larvae generally succumb before pupation ; in captivity they die in much shorter time than uninfected ones. The pupae and adults appear to be free from infection.

WICKWARE (A. B.). **An unusual Form of Scabies in Fowls.**—*Jl. Parasitology, Urbana, Ill.,* viii, no. 2, December 1921, pp. 90–91, 2 figs.

Megninia gallinulae, Buchh., was taken from scrapings from the head and legs of cockerels received from Quebec. The symptoms produced by this mite, involving marked desquamation, are described. Experiments in artificial transmission by the application of scrapings containing the parasite to scarified surfaces of healthy hens proved negative.

Fullaway (D. T.). **Horn Fly Control.**—*Hawaiian Forester & Agriculturist, Honolulu*, xviii, no. 10, October 1921, pp. 219–221, 1 plate. [Received 2nd February 1922.]

The control of the horn fly [*Lyperosia irritans*] is the outstanding entomological problem in Hawaii. In January 1921 a consignment of *Onitis phartopus*, *Catharsius molossus* and *Onthophagus* sp., was received from the Philippine Isles, but was not reared successfully. During the summer four consignments of other dung beetles, chiefly *Onthophagus pugnax*, were received from Australia. These consisted entirely of adults, and they failed to establish themselves. Investigations into the habits of these beetles in Australia show the advantage in collecting and shipping them in the larval stage, as abundance of material can be gathered at any season, and they can be shipped without loss or injury in this immature condition. It was further thought that the beetles emerging from the pupal cells would be ready to work immediately on manure. The difficulty arose when they reached Hawaii, owing to the slow progress of the larvae in maturing. The cells containing the larvae could not be placed in the ground in situations similar to those from which they had been removed, as the foreign soil might contain harmful insects, and it was known that a small beetle, which in Australia retards the development of these dung beetles, was present in the soil. The cells therefore had to be kept in quarantine. The adults emerged in September, and continued to do so till the end of October, 300 in all being liberated. Several species of Staphylinid, Silphid and Histerid beetles, which are predacious on the immature stages of *L. irritans*, were also introduced from Australia, and were liberated under conditions favourable to their acclimatisation and establishment.

Endeavours have been made to obtain other enemies from less remote countries, and in October and November the following were received from the south-west United States: *Copris colonicus*, *C. remotus*, a small *Canthon*, a metallic *Phanaeus*, Staphylinid and Histerid beetles, and the parasites *Spalangia* sp. and *Eucolia* sp.

Bishopp (F. C.). **The Fowl Tick and how Premises may be freed from it.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1070, rev. edn., October 1921, 16 pp., 9 figs. [Received 6th February 1922.]

The information contained in this bulletin on *Argas persicus* has already been noticed [*R.A.E.*, B, viii, 70].

Crumb (S. E.) & Lyon (S. C.). U.S. Bur. Ent. **Further Observations on the Effect of Chemicals upon Oviposition in the House Fly.** —*Jl. Econ. Ent., Geneva, N.Y.*, xiv, no. 6, December 1921, pp. 461–465.

The present observations, carried out in 1918 and 1919, were conducted on similar lines to those of 1916 [*R.A.E.*, A, iv, 67.] The substances tested, however, are less volatile than those previously used and were applied in solution direct to the medium, which was bran husks washed and sterilised immediately before use. In addition to carbon dioxide and ammonia thirteen different substances were tested. The various solutions, with the exception of sodium carbonate, sodium sulphate and calcium hydroxide, were approximately of equal

chemical strength, the potential hydrogen ion or equivalent being equal to that in a 2 per cent. (by weight) solution of butyric acid. The calcium hydroxide solution was saturated at 20° C.

In the case of sodium carbonate, which was the most attractive, the moistened bran baits tested before exposure were neutral to phenolphthalein but, after six hours, the acidity measured by the same indicator was practically equal to the alkalinity obtained by the dosage used in the sodium carbonate units. It is possible that the carbonic acid in the sodium carbonate becomes completely liberated, and this free carbonic acid in the moist bran bait may account for the fact that the highest percentage of eggs was obtained in these cases. The authors consider this a confirmation of the results obtained with carbon dioxide in the previous observations [*loc. cit.*]. Sodium hydroxide is moderately attractive, its effect depending on the liberation of carbon dioxide as a result of a sequence of changes.

The sodium ion present in sodium sulphate, sodium carbonate and sodium hydroxide is not a repellent to house-fly oviposition, and its presence in some salt combinations may be moderately attractive. Gravid house-flies appear to be indifferent to the presence of the organic bases, grain alcohol and glycerine, as well as mixed compound lactic acid. Hydrochloric and sulphuric acids appear to be moderate repellents.

The house-fly (*Musca domestica*) is attracted for oviposition by decaying organic matter in proportion to the amount of carbonic and acetic acids liberated in the process of fermentation ; this may also account for its preference for decaying vegetable rather than animal matter. The predisposition for these two acids may also explain the affinity of the house-fly for human environments generally and particularly dwelling-houses and stables.

MAXWELL (J. P.). **Filariasis in China.**—*Philippine Jl. Sci., Manila,* xix, no. 3, September 1921, pp. 257–327, 24 plates, 4 charts, 1 map. [Received 7th February 1922.]

The greater part of this paper is devoted to filarial diseases from the clinical point of view ; but some account of the filariae, their life-history and transmission is also given.

Filariasis in man in China is caused almost exclusively by *Filaria bancrofti*, transmitted by mosquitos [*R.A.E.*, B, viii, 115]. *Culex fatigans* and *C. pipiens* are both common, though it is possible that there are other Culicids that are potential carriers.

All classes and ages are subject to the disease, but in China women are much less often infected than men, while labourers are more often infected than those leading a sedentary life. Probably dress, particularly the amount of leg that is normally bare, contributes to this.

CRAIGHEAD (E. M.). **Observations on certain Siphonaptera.**—*Ent. News, Philadelphia,* xxxii, no. 10, December 1921, pp. 303–308.

This paper describes observations on *Ctenocephalus canis*, Curt., *C. felis*, Bch., and *Ceratophyllus fasciatus*, Bosc.

It was proved that no larvae survive in a temperature of 70° F. or more without moisture A table is given showing the result of moisture and temperature on the hatching of the eggs. The larvae thrive best when fed on adult flea faeces. Eggs hatched in an average of 4 days, the larval stage occupied 14 days, the pupal 4 days, and

if the adults were fed daily, they could be kept alive for a period of 30 to 40 days.

The scarcity of fleas on a large number of rats obtained at Massachusetts was investigated, and it was proved that the fleas, after feeding on their natural host, went into hiding. Rats gather in nests under stable floors in the winter, and it is in such places as these that the life-cycle of the flea continues throughout the year. If the beds of household animals are kept dry and cleaned every few days, there is little chance of the larvae maturing, but in a wet season if the animals are out of doors there is sufficient moisture to complete the life-cycle. Wild fleas removed from their natural host and fed on monkeys, rabbits and guinea-pigs died in about five days, but reared specimens placed on an unnatural host could be kept alive for 30–40 days.

Wallis (T. E.). **Moths as Pests in the Pharmacy.**—Reprint from *Pharmaceutical Jl. & Pharmacist* [*London*], 17th December 1921, 8 pp., 5 figs.

Stocks of stored drugs are often infested with such pests as *Sitodrepa panicea*, *Ephestia kühniella* and Tyroglyphid mites. Larvae of *Corcyra cephalonica*, Staint., are reported to have been found in various substances such as starch, poppy heads, whole and crushed linseed, etc., and in various chemicals. This moth has been frequently found in flour and grain, especially rice. A complete description of this insect and its life-history, as well as that of *E. kühniella*, is given [*cf.* *R.A.E.*, A, i, 292, etc.].

The author found large numbers of *Borkhausenia pseudospretella*, Staint., in valerian root. This moth is a common inhabitant of houses, the larvae feeding on dried plants, skins and seeds. It has also been found in the starch and poppy heads mentioned above. It appears to have been introduced from America about 1840 and prefers cool climates. A full description is given of the larvae and adults.

The oldest remedial measure against these pests is the application of heat for a sufficient length of time. Experiments have proved that the maintenance of a temperature of 140° F. for a quarter of an hour kills all the eggs, larvae and adults. Larvae of *E. kühniella* are killed by exposure to 120° F. for twenty minutes. When moths attack large bags of commodities, it is necessary to continue the heating until the required temperature is reached in the centre of the bags. In the case of cocoa this can be done by keeping a store heated by air driven over steam-heated pipes for a period of two or three days. A less satisfactory method is fumigation with carbon bisulphide in a closed vessel, but eggs are not killed by this process and only 50 per cent. of the larvae. Formaldehyde, carbon tetrachloride and trichlorethylene have been tried with indifferent success. Sulphur dioxide and hydrocyanic acid might be useful if they were not objectionable from other points of view. Cold delays the development of the eggs and larvae, but does not kill them.

MacArthur (W. P.). **A Holotrichous Ciliate pathogenic to** *Theobaldia annulata*, **Schrank.**—*Jl. R.A.M.C., London*, xxxviii, no. 2, February 1922, pp. 83–92, 5 figs.

The ciliate here described as infesting *Theobaldia annulata*, Schr., taken from a field dyke near Blackpool, is thought by Wenyon to belong to the genus *Cyclidium* or *Pleuronema*.

Infection probably occurs by ingestion of small ciliates, which might readily pass through the gut wall into the body cavity and spread all over the body. Although *Anopheles bifurcatus*, L., and *Culex pipiens*, L., were kept in the same vessel as the infected *Theobaldia*, they remained free from attack.

Boyd (J. E. M.). **The Botany and Natural History of the Dyke-Land near Sandwich, Kent, as far as they concern Medical Entomology.** *Jl. R.A.M.C., London,* xxxviii, nos. 1 & 2, January and February 1922, pp. 41–47 & 117–130.

This paper contains a list of all the insects of medical interest caught locally during the period from 1st April 1920 to 1st January 1921, and includes *Pediculus humanus*, various fleas, the Tabanids, *Haematopota crassicornis* and *Chrysops relicta*, and the mosquitos, *Anopheles maculipennis*, *A. bifurcatus*, *Culex pipiens*, *Theobaldia annulata*, *T.* (*Culicella*) *morsitans*, *T.* (*C.*) *fumipennis* and *Aëdes* (*Ochlerotatus*) *rusticus*.

Anopheles maculipennis was far the more common of the two Anophelines ; the larvae occurred in most of the dykes throughout the summer, and the adults in cowsheds and stables throughout the year. The first males were caught on 28th May and the last on 2nd and 10th November, which is later than is generally recorded. During December there was a great decrease in the number of hibernating females, and the destruction of the hibernating individuals must necessarily reduce the number of mosquitos in a given area in the following spring. In the laboratory at a mean temperature of 60° F. eggs were deposited up to November. The 30th April was the earliest date on which larvae were found in the dykes near the hibernating places. The water in which they are found generally varies from fresh to saline, but on one occasion they were found in a rain-water barrel and in a solution of horse manure. Under laboratory conditions, eggs laid in September hatched after two days, the larvae pupated after another 22 days and the adults emerged after five days, giving a total of 29 days. The usual period for development is from 18 to 20 days, the delay in this case being probably due to a limited food supply.

Very few adults of *A. bifurcatus* were caught. Most of the larvae were found in dykes that had banks overgrown with weeds and in which the water was almost stagnant in parts. The winter is passed in the larval stage, which is apparently not affected by cold, as larvae were taken in December from a dyke that was completely frozen over.

Adults of *Culex pipiens* were found throughout the year. The first egg-raft was found 15th April. At an average temperature of 65° F. the eggs hatched in a day, the larval stage lasted 23 days and pupation 26 days. Adults of *Theobaldia annulata* were also found throughout the year. Whether only adult females hibernate is still an open question, as larvae and pupae were found in the dykes up to 14th January 1921. On one occasion a larva was seen feeding on the roots of *Azolla*, and it was proved that males do emerge during the winter months. The larvae live in the same dyke as *A. bifurcatus*, and will also live in dirty water, but not in such foul water as *C. pipiens*. Many experiments on the effects of cresol, paraffin and other substances on mosquito larvae were made. A 20 per cent. saline solution was fatal to both larvae and pupae.

Flies collected included the Muscids, *Musca domestica*, *Calliphora erythrocephala*, *Lucilia caesar* and the Anthomyiids, *Fannia canicularis* and *Hydrotaea dentipes*. In experiments against these flies good results were obtained with formalin vapour—20 cc. of 40 per cent. formaldehyde, 8 grm. potassium permanganate (powdered) for each 1,000 cu. ft.—and formalin in solution —10 parts of 40 per cent. formaldehyde, 50 lime water, 2 sugar, and water up to 100. Of the various substances added to a solution of treacle and water the following killed all flies in from 24 to 48 hours : sodium arsenite, 10 per cent. ; sodium iodate, 2 to 5 per cent. ; sodium fluoride about 2 to 5 per cent. ; ammonium fluoride, 10 per cent. ; potassium iodate about 2 to 5 per cent. ; and copper acetate about 2 to 5 per cent. Beta-naphthalene was apparently useless. Formalin solution is considered to be the best for indoor use, and sodium arsenite for manure heaps, etc., for which purpose ammonium fluoride is also suitable and less poisonous.

Bermuda Pests Destruction Act.—*Agric. News, Barbados*, xxi, no. 515, 21st January 1922, p. 25.

An act has been passed by the Government of Bermuda making it lawful for the General Board of Health to enforce byelaws for the prevention of the breeding and spread of mosquitos, horse-flies and rats ; for this purpose £1,000 has been voted for the next financial year. No legal action can be brought against the Board for carrying out the provisions of the Act, and the expenses incurred by the Board's Inspectors for work done, up to £10, are recoverable from the occupier of the premises dealt with.

Martin (A.) & Lasserre (R.). **La Piroplasmose du Chien.**—*Ann. Méd. Vét., Brussels*, lxvii, no. 1, January 1922, pp. 19–22.

The symptoms and treatment of piroplasmosis of dogs due to *Piroplasma canis* are described. In France the disease is transmitted by *Dermacentor reticulatus* and probably also by *Rhipicephalus sanguineus*. The disease generally appears after a day's hunting, chiefly in the autumn and winter, and, in the neighbourhood of Paris, especially during September and April.

Edwards (F. W.). **A synonymic List of the Mosquitoes hitherto recorded from Sweden, with Keys for determining the Genera and Species.**—*Ent. Tidskr., Stockholm*, xlii, no. 1, 1921, pp. 46–52. [Received 13th February 1922.]

The following mosquitos occur in Sweden : *Anopheles maculipennis*, Mg., *A. bifurcatus*, L., *A. plumbeus*, Steph., *Culex pipiens*, L., *Theobaldia annulata*, Schr., *T. siberiensis*, Ludl., *T. glaphyroptera*, Schin. (*bergrothi*, Edw.), *T. morsitans*, Theo., *T. fumipennis*, Steph., *Taeniorhynchus richiardii*, Fic., *Aëdes* (*Ochlerotatus*) *vexans*, Mg., *A. maculatus*, Mg., *A. semicantans*, Mart., *A. annulipes*, Mg., *A. excrucians*, Wlk., *A. lutescens*, F., *A. caspius*, Pall., *A. dorsalis*, Mg., *A. alpinus*, L., *A. cataphylla*, Dyar, *A. communis*, DeG., *A. punctor*, Kirby, *A. geniculatus*, Oliv., and *A. cinereus*, Mg.

Species found in Finland, Denmark or North Germany, and likely sooner or later to be found in Sweden, are : *Culex apicalis*, Adams,

Theobaldia subochrea, Edw., *Aëdes* (*Ochlerotatus*) *freyi*, Edw., *A. rusticus*, Rossi, *A. salinellus*, Edw., *A. detritus*, Hal., *A. diantaeus*, H. D. & K., *A. intrudens*, Dyar, *A. pullatus*, Coq., *A. parvulus*, Edw., and *A. sticticus*, Mg.

The synonymy of all these species is given, together with generic and specific keys.

Zibordi (D.). **The Toxicity of the Extract of the Horse-Bot** (*Gastrophilus equi*).—*La Clinica Veterinaria, Milan*, xliii, nos. 17–19, 15th & 30th September, 15th October 1920, pp. 470–476. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xii, no. 5, May 1921, pp. 587–588). [Received 15th February 1922.]

The symptoms produced by the injection of the extract of horse bot-fly larvae (*Gastrophilus equi*) in particular, and of that of all parasites in general, are due to poisons which may attack the cerebrospinal nervous system by preference, and, at the same time, have an action on the heart, almost like a specific cardiac toxin ; further, according to Weimberg and Seyderhelm, they may have a haemolytic effect similar to that of a haematic toxin.

Kretzschmar (—). **Treatment of Sheep Scab by Sulphur Dioxide Gas.**—*Deutsche Landw. Tierzucht, Hanover*, xxiv, no. 40, October 1920. (Abstract in *Internat. Rev. Sci. & Pract. Agric., Rome*, xii, no. 5, May 1921, pp. 589–590). [Received 15th February 1922.]

With the revival of sheep breeding in Germany, sheep scab has again spread rapidly. Sulphur dioxide has proved signally successful in treating this form of mange. An apparatus for fumigating sheep with this gas is described. It is in the form of a large wooden box, weighing about 1,000 lb., and holds four animals. It is fitted with india-rubber collars through which the animals' heads emerge. Shorn individuals require 50 minutes' treatment with 4 volumes per cent. of sulphur dioxide fumes ; if the sheep are unshorn, a 4½ per cent. concentration must be used for the same time.

Eugling (M.). **Ueber Malariabekämpfung. Beobachtungen und Untersuchungen aus dem albanischen Malaria-Gebiet.** [Malaria Control. Observations and Researches in the Albanian Malaria Region.]—*Beihefte Arch. Schiffs- u. Trop.-Hyg., Leipsic*, xxv, no. 1, 1921, 63 pp., 6 figs. [Received 15th February 1922.]

When Albania was occupied in 1916 by the Austro-Hungarian armies, 20 per cent. of the troops suffered from malaria, and 52 per cent. in 1917. The mountain zone was nearly free from malaria at the time of occupation, the average figure for 1917 being only 6 per cent., of which many cases originated in the plains.

Such troops and road gangs as remained in the plain and along the coast suffered from malaria to the extent of 70–90 per cent., an important feature being the predominance of severe malignant tertian [*Plasmodium praecox*]. In a group of 20,185 blood examinations there were 10,411 positive findings, of which 78·4 per cent. were malignant tertian, 20·9 benign tertian, 0·16 quartan, and 0·54 mixed infections, etc.

Anopheles maculipennis is the commonest Anopheline in Albania. Warm animal quarters, especially low goat sheds, are preferred as shelters to human dwellings, which are usually colder. The species of animal seems of less importance than the construction and temperature of its dwelling. Goat sheds built of wood and straw harbour thousands of mosquitos, whereas those constructed of stone only contain a few. All the specimens found in winter were females, though a few males, usually 2 per cent., may occur in October. The percentage of males is subject to daily variations that need biological investigation. The highest (37 per cent.) occurs during the first summer flight ; in August the average is 20–25 per cent., and this figure falls to 10–12 per cent. in September. Of the hibernating females a very large number perish, and the mortality may amount to nine-tenths of those in stone-built houses.

In one instance an epidemic was observed, evidently due to an infectious disease ; a fungus, similar to *Empusa muscae*, and a micro-organism, *Bacillus subtilis*, were both observed on this occasion.

Measures against the adults are the most important form of work in the cold season, and the best time for them is in the autumn. They were carried out by burning the mosquitos off with a blow lamp, by sulphur fumigation (2 gm. per cu. metre of space), which was effective only in the better built houses, and by spraying with a solution of formaldehyde soap (2 per cent. formalin and ½ per cent. soap). In the last-named measure, soap of a good quality is essential if the formalin is to prove effective. Cresols have a marked killing action on mosquitos, and both lysol and lysolcresol contain enough soap to be very efficient. These solutions were not only sprayed but were poured into cracks in floors. They are better than formaldehyde for use in stables owing to the absence of pungent vapour.

From May to June the hibernated female flies in the open, deposits 250–300 eggs, and dies—usually on the day following oviposition. In August only 150–200 eggs were laid, and the females did not die. Specimens captured in September and October laid only 50–70 eggs, and also remained alive.

The eggs laid in late autumn are darker in colour, owing to a thicker chitinous shell, than those laid in summer ; they are laid singly and often sink in water. In the incubator, at a temperature of 37° C. [98·6° F.] they required 8–10 days to hatch, whereas summer eggs do so in 2–3 days. They appear to be true winter eggs adapted for hibernation in the open. From muddy reeds placed in water in a warm room newly hatched Anopheline larvae were obtained in about three weeks, so that it is certain that the dry mud protects the eggs against cold and that the floods due to the spring thaw cause hatching. Such eggs produce larvae at an earlier date than that on which the winter adults appear in the open. Hibernating larvae were never found.

Experiments show that when exposed for a long time to a temperature at freezing point the larvae become motionless and sink to the bottom of the water. In nature this must prevent them from being frozen in ice, and results in their reaching the lower, warm layers of water. All the experimental larvae died after six hours when frozen in ice. Where the temperature varied from $-2°$ to 10° C. [28·4° to 50° F.] and a coat of ice was formed for only eight hours daily, the larvae began to die only after 2½ months. Feeding did not increase their size, nor did they pupate, but when placed in a temperature of 22° C. [71·6° F.] they pupated within 48 hours and became adult

within 10 days. Cold, especially intermittent cold, therefore does little harm to larvae unless they are actually in ice, though their development is retarded. Feeding is another factor in development, which is much prolonged when the food-supply is limited. Development from winter eggs kept in a sunny but unheated room from April onwards required 50–60 days ; under the same conditions from summer eggs laid at the end of May it needed 35–38 days ; 30–32 in June ; 28 in July ; and 24 in August. In the open air these periods would be slightly longer.

Larvae and pupae did not seem to be injured in puddles at temperatures of 35°–38° C. [95°–98·6° F.], but even a short exposure to 42° C. [107·6° F.] suffices to kill the larvae, and at 45° C. [113° F.] both larvae and pupae all die. This last temperature often occurs in tins lying exposed on the ground.

Larvae of *A. maculipennis* die in undiluted sea-water within 2–3 hours of transfer from fresh water, probably owing partly to the action of other salts besides sodium chloride, as a simple solution of the latter only killed the larvae in 7–24 hours. Brackish water containing only a little sea-water is favourable to development, and the sea-water content must be increased to one-half in order to prove fatal.

Oiling is effective except where reeds are abundant, as they absorb the oil. The planting of *Azolla, Lemna* and other aquatic plants seems to favour breeding. Better results are achieved with plants requiring so much water as to cause collections of water to disappear, and sun-flowers have proved very suitable in Albania for this purpose. Trap breeding-places resulted in the destruction of many larvae, and though nine-tenths of these were *Culex*, the trouble involved is very slight.

Counts made in connection with screening tests showed that an increase in Anophelines preceded an increase in malaria cases by a length of time exactly equal to the incubation period. In 1918 the first occurrence of young adults was early in July, and malaria increased in mid-July. Such a connection is only possible, however, if the young adults are capable of infection on emerging and without being infected from a patient. As the weather is somewhat cool in June, incubation must require more than 11 days. Mosquitos that are infective at the end of June have acquired infection in the middle of that month, but they were then in the larval stage and only hibernated females were present. It would therefore seem that young adults, as well as hibernated females, are capable of transmitting infection.

Jancsó (N.). **Experimentelle Untersuchungen über die die Malariainfektion des *Anopheles* und des Menschen beeinflussenden Umstände.** [Experimental Researches on the Circumstances influencing Malaria Infection in *Anopheles* and in Man.]—*Beihefte Arch. Schiffs- u. Trop.-Hyg., Leipsic,* xxv, no. 2, 1921, 48 pp., 9 figs. [Received 15th February 1922.]

In experiments made from 1901 to 1905 at Kolozsvar, Transsylvania, *Anopheles maculipennis* was most easily infected with *Plasmodium praecox*, which affects man most severely ; *P. vivax* had a moderate infectibility as regards the mosquito and a moderate severity in man ; quartan malaria had the least infectibility for the mosquito and the least severity in man.

In the case of infection with *P. vivax* the blood of the patient may, even during the first attack, harbour gametes capable of further development in the mosquito. In infection with *P. praecox* gametes

occur in the patient's blood only after 6–7 days ; at the time they first appear they are capable of further development in the mosquito.

The development of the sexual generations of all three plasmodia is most rapid between 24° and 30° C. [75·2°–86° F.]. A higher temperature than 30° C. did not materially accelerate such development in *P. vivax* and *P. praecox* and proved harmful to the life of the mosquito. Below 24° C. such development was materially and rapidly checked, until it ceased at 16° C. [60·8° F.].

The occurrence of infection was not affected when the mosquito, immediately after feeding, was exposed to a low temperature for a short time. Such an exposure seemed indeed, like the presence of quinine in the blood, to promote the occurrence of infection. The gametes that had already begun development at an optimum temperature were not affected by a low temperature of 60·8° F. if exposed to it only for a short time ; but after a prolonged exposure to a continuous low temperature the sporozoites failed to develop.

Quinine in the blood containing the gametes or in the blood used later for feeding the mosquito was not detrimental to the development of the sexual generation, and malaria parasites resulting from the bite of such a mosquito were not resistant to quinine.

As regards the production or non-production of the infection in the mosquito it is immaterial whether the bite occurs during the latent period or not, nor does its occurrence during any one of the febrile attacks of the patient or during any one phase of them matter at all. Mosquitos, already infected, can acquire a new infection of the same or other strain of gametes.

Whatever temperature the infected mosquitos were kept at, they did not transmit malaria before the tenth day. In all cases, except where quinine prophylaxis was resorted to, the bite of a mosquito, of which the salivary glands contained sporozoites, transmitted malaria, and a single bite sufficed. The incubation periods observed were 10 days for *P. vivax* and 7–11 days for *P. praecox*. By administering quinine during the incubation period the latter was prolonged.

In these experiments no apparent influence on the incubation period of experimental malaria, on its severity, or on the amount of quinine required to repress it, was traced either to the number of the mosquitos causing inoculation, the degree to which they were infected, or the temperature at which they were kept.

The malarial parasite found in artificially infected cases was always that occurring in the infecting mosquito, and the results of the various experiments justify the assumption that there are three different malarial plasmodia.

No data were obtained showing that either man or mosquito can develop an immunity to malaria.

Quinine, either in daily doses of 0·5–1 gm. or in 5–6 day doses of 1–5 gm., can destroy an existing infection.

Schilling (V.). **Kriegshygienische Erfahrungen in der Türkei (Cilicien, Nordsyrien).** [Experiences in Military Hygiene in Turkey (Cilicia and North Syria).]—*Beihefte Arch. Schiffs- u. Trop.-Hyg., Leipsic,* xxv, no. 3, 1921, 41 pp., 2 figs, 4 plates. [Received 15th February 1922.]

The lines under the author's supervision extended from Bozanti in the Taurus eastwards to Mardin on the Tigris, and from Aleppo southwards to Damascus.

Curiously enough, malaria was less widespread in the plains than in the villages in the hollows of the mountains, where the abundance of water, great heat and dense vegetation all favoured Anophelines, and the rocky stream beds provided them with breeding-places that were difficult to deal with. The large towns, such as Aleppo, Adana and Tarsus, which are dry and treeless, were comparatively free from malaria. Benign tertian was the chief form of malaria, while quartan, which occurs in Jerusalem, was scarcely found.

Typhus was the insect-borne disease next in importance. In summer the disease disappears almost entirely, because the heat hinders the transfer of lice and the frequent opportunities for washing reduce their numbers. Any slight obstacle to its natural spread seems to exercise a considerable check on this disease, and the very incomplete measures adopted hindered its diffusion in spite of the continued presence of lice.

Recurrent fever had the same distribution and winter epidemic period as typhus, thus proving its dependence on lice.

Sand-fly fever, which was scarcely noticeable among the natives, affected travelling Turks and Germans. Its presence was undoubtedly connected with that of *Phlebotomus*. In one case *Rickettsia*-like organisms were found in the gut of a female midge that had sucked blood from a patient.

A small epidemic of dengue occurred early in 1917 ; *Aëdes* (*Stegomyia*) sp., the supposed carrier, was very numerous.

Solely on account of its name, special attention was given to the Aleppo boil. It seemed to be on the decrease and occurred chiefly among native children in dirty parts of the town. This decrease is associated with the draining of a swamp in the neighbourhood of the town, and as *Phlebotomus* has remained abundant, the facts seem to be opposed to Sergent and Patton's theory of the transmission of the boil by these sand-flies.

GALLI-VALERIO (B.). **Beobachtungen über Culiciden, nebst Bemerkungen über Tabaniden und Simuliden.** [Observations on Culicids, with Remarks on Tabanids and Simuliids.]—*Centralbl. Bakt. Paras. Infekt., Jena,* Ite Abt. Orig., lxxxvii, no. 7–8, 31st January 1922, pp. 557–560.

In 1920, even as late as 20th November, both larvae and pupae of *Theobaldia annulata* and many small larvae of *Anopheles bifurcatus* were found at Vidy, the temperature of the air being 6° C. [42·8° F.] and that of the water 10° C. [50° F.]. Most of the pools had dried up by December, but a few of these larvae were found on 14th December and were still alive on 22nd January 1921. This pool subsequently dried up, and only on 3rd June was water again seen in it, with many small larvae of *Culex* apparently three days old. On 24th June the first pupae of *Culex* appeared, and on 9th July young larvae of *T. annulata* and *A. bifurcatus* were seen. After two weeks of rain the pool contained on 26th August many larvae and pupae of *Culex pipiens*, *T. annulata* and *A. bifurcatus*, and some of *A. maculipennis*.

The drought in 1921 resulted in a mosquito plague in the Canton of Valais, because barrels and other receptacles were placed in every garden for collecting water, and they proved excellent breeding-places.

On the Alpine pastures of Vaud and Valais TABANIDAE had never been so abundant as in the summer of 1921. The view that their presence is connected with that of cattle is discounted by the fact

that they were quite as numerous on pastures where cattle had been absent since the preceding summer. *Tabanus bovinus* did not bite the author, those that did so being females of *T. bromius*, *T.* (*Atylotus*) *ater*, *T.* (*Therioplectes*) *solstitialis*, *Chrysops coecutiens* and *Haematopota pluvialis*.

The life-history of the Simuliids living on the Alps is still unknown. As large swarms occur at altitudes over 6,500 feet, they either do not breed in running water or they are capable of flying considerable distances. An observation of the author's seems to confirm the former view. In 1921 the drought had dried up many small Alpine lakes, whereas streams continued flowing in the valleys. If the Alpine Simuliids breed in flowing water, they should have continued to be abundant, but, on the contrary, they were scarce, and in some places even absent. No larvae were found in the Alpine streams, but after snow and rain in August new pools occurred and Simuliids appeared on the Alps.

The author failed to induce *Simulium gallii* to bite him.

DA COSTA LIMA (A.). **Sobre os Streblideos americanos (Diptera-Pupipara).** [American Streblids.]—*Arch. Escola Sup. Agric. e Med. Vet., Nictheroy*, v, no. 1–2, September 1921, pp. 17–34, 2 plates. [Received 15th February 1922.]

Most of the species dealt with are Brazilian, and include *Aspidoptera minuta*, sp. n., and *Pseudostrebla ribeiroi*, gen. et sp. n., both from *Tonatia amblyotes*. A key is given to the American genera of STREBLIDAE and to the species of *Aspidoptera*.

PILI (R.). **La Rogna negli Equini.** [Horse Mange.]—*Allevamenti, Palermo*, iii, no. 1–2, January–February 1922, pp. 40–42.

The three forms of horse mange—sarcoptic, demodectic or psoroptic, and symbiotic—are described, with notes on the respective causative mites and instructions for treatment. Helmerich's ointment, tobacco extract, carbon bisulphide, Alessandri mixture (consisting of 1 part chloroform, 1 part petroleum, and 2 parts olive oil), and the fumes of sulphurous anhydride are among the remedies mentioned.

CHANDLER (S. C.). **A Study of the Malarial Mosquitoes of Southern Illinois. II. Operations of 1920.**—*Bull. Illinois Nat. Hist. Survey, Urbana*, xiv, art. iii, November 1921, pp. 23–32, 5 figs., 3 tables. [Received 16th February 1922.]

The mosquito survey of Southern Illinois which was begun in 1918 [*R.A.E.*, B, viii, 178] was continued in 1920 around Herrin.

The following species were reared: *Anopheles quadrimaculatus*, Say (*guttulatus*, Harris), from pools, mine ponds and a swampy wood; *A. punctipennis*, Say, from pools, mine ponds, swampy woods and domestic places; *A. crucians*, Wied., *Theobaldia* (*Culiseta*) *inornata*, Will., and *Culex apicalis*, Adams, from mine ponds; *C. restuans*, Theo. (*territans*, Wlk.), from mine ponds and open drains; *C. pipiens*, L., and *C. salinarius*, Coq., from mine ponds, open drains, swampy woods and domestic places; *Aëdes degustator*, Dyar, from woodland pools and mine ponds; and *A. canadensis*, Theo., from woodland pools. The discovery of the salt-marsh species, *Anopheles crucians*, Wied., and *Aëdes sollicitans*, Wlk., so far inland has already been noticed [*R.A.E.*, B, ix, 88]. Exactly the same numbers of *Anopheles quadrimaculatus*

and *A. punctipennis* were reared from the monthly collections, whereas in 1918 the former was rare. As drainage, which is the most effective remedial measure, cannot be practised at Herrin, owing to the necessity for maintaining ponds connected with the mines, it is suggested that the edges of these should be cleaned, that oil should be applied in some way, and that they should be stocked with fish, especially top-minnows.

BALFOUR (A.). **A Medical and Sanitary Survey of Mauritius: Past, Present and Future.**—*Trans. R. Soc. Trop. Med. & Hyg., London,* xv, no. 5–6, 17th November & 15th December 1921, pp. 157–179, 50 figs.

The character of the country and conditions found in Mauritius, with especial relation to malaria, are described. Previous epidemics are reviewed, and the advantages and possibilities of rendering the island free from malaria are discussed.

DUNDERDALE (G.). **Notes on the Incidence of Filarial Infection in the Neighbourhood of Lamu, British East Africa.**—*Trans. R. Soc. Trop. Med. & Hyg., London,* xv, no. 5–6, 17th November & 15th December 1921, pp. 190–197, 1 map.

Investigations on the subject of filariasis and elephantiasis in the neighbourhood of Lamu are recorded The clinical appearances of these diseases, which occur along the coast of East Africa, with the exception of the most northerly portion, and the climate and physical features of the island of Lamu are described.

Ticks, fleas and lice are not very common, but bed-bugs [*Cimex*] abound. The following mosquitos are universal: *Culex fatigans, Aëdes argenteus* (*Stegomyia fasciata*), *Anopheles* (*Pyretophorus*) *costalis* and *Skusea* (*Howardina*) *pembaensis*. Embryonic *Filaria bancrofti* were found in the peripheral blood of all cases returned as infected. Up to date, 35·33 per cent. of the cases examined show infection with this filaria.

HONE (F. S.). **A Series of Cases closely resembling Typhus Fever.**—*Med. Jl. of Australia, Sydney,* 9th Year, i, no 1, 7th January 1922, 1–13, 4 charts.

An account is given of a disease observed near Adelaide closely resembling typhus fever. The scattered nature of the cases and the fact that no two occurred in the same house point strongly to transmission by insects, though these were apparently not lice. The balance of evidence is at present in favour of the cases being a form of typhus, and that weevils or weevil-infested wheat are in some way concerned in its dissemination, but further investigations are required before this can be accepted as proved.

FLU (P. C.). **Some Notes on an Inquiry on the Spread of *Filaria bancrofti* among the native Inhabitants of Weltevreden.**—*Meded. Burg. Geneesk. Dienst Ned.-Indië, Batavia,* 1921, pt. 3, pp. 331–363. [Received 22nd February 1922.]

Brug showed that though *Culex fatigans* is present and can convey *Filaria bancrofti*, and there is no lack of intermediate hosts, the comparative rarity of filariasis at Batavia remains unaccounted for [*R.A.E.*, B, ix, 8].

In an investigation of the occurrence of *F. bancrofti* among the native inhabitants of Weltevreden (Batavia) from December to January 1921, the original plan of confining examination to permanent residents failed, and this fact ultimately supplied the explanation why filariasis is uncommon at Batavia in spite of conditions favourable to it. The organism concerned appears to be *Microfilaria nocturna*, and success attended attempts to infect *Culex fatigans*, *Aëdes* (*Stegomyia*) *scutellaris*, *Anopheles* (*Myzomyia*) *ludlowi* and *A. subpictus* (*rossi*) with it. In these hosts the microfilaria develops in the same manner as *F. bancrofti*. The first two proved to be the most suitable carriers.

The incidence of infection of *F. bancrofti* in both hemispheres is recorded, showing that the figures for Batavia are much lower than those for Africa, but do not differ greatly from those of countries near Java.

At Batavia there is a sufficient number of human carriers of *Microfilaria bancrofti*, and both climate and temperature are very favourable to the spread of the parasite. Development in the mosquito is quickest between 25° and 29° C. [77°–84° F.], when full-grown larvae occur in the proboscis fourteen days after the mosquito has fed. In order that a mosquito may infect man, the skin of the latter must be moist. The warm, damp, coast climate of Batavia, where the mean temperature is 27° C. [80°·6 F.], is therefore very suitable. The fact that only a small percentage of natives at Weltevreden and Batavia are permanent residents supplies the explanation of the comparative rarity of the disease. In a group of 1,112 persons examined, 216 had been less than a year at Weltevreden, and the percentage of infection among them was 2·3. Among the remainder the figure was 10·1 per cent. The maximum number of larvae found in the blood of the former was 110, with an average of 21. Among the others the figures were 40 and 16. Temporary inhabitants are therefore not the source of the infection, which appears to be endemic. As only infection and reinfection during many consecutive years can ensure a large part of the population becoming carriers, the temporary inhabitants serve as traps for the *Filaria*, and leave the town before the larvae occur in the peripheral blood.

The author is of opinion that unless conditions change within the next few decades filariasis is not likely to increase at Batavia. Active measures against the disease will require the provision of an abundant supply of good water, followed by the prohibition of cisterns and other mosquito breeding-places.

Dyar (H. G.). **New Mosquitoes from Alaska.**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, x, no. 1–3, January–March 1922, pp. 1–3.

Aëdes punctodes, sp. n., larvae of which were obtained from pools in the tundra, and *Aëdes prolixus*, sp. n., are described.

Dyar (H. G.). **The American** *Aëdes* **of the** *impiger* (*decticus*) **Group (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, x, no. 1–3, January–March 1922, pp. 3–8.

The species here described are considered solely as they occur in North America. It is probable that some of the same species occur in northern Europe, and if this is the case, *A. lazarensis*, F. & Y., will become a synonym of *A. communis*, DeG., but as the American forms

will doubtless remain as races, the change will not be a radical one. Two series exist, the *lazarensis* series, in which the male hypopygium has the apical lobe of the side-piece well haired, and the *impiger* series, in which it is nearly bare.

DYAR (H. G.). **Note on the Male Genitalia of** *Culex coronator* **and allied Forms.**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, x, no. 1–3, January–March 1922, pp. 18–19, 1 plate.

A description is given of the variation occurring in the male genitalia of *Culex coronator*, D. & K., *C. usquatus*, Dyar, *C. ousqua*, Dyar, and *C. usquatissimus*, sp. n., from Panama.

BONNE-WEPSTER (J.) & BONNE (C.). **A new Coloration for the Species of the Genus** *Goeldia*.—*Insecutor Inscitiae Menstruus, Washington, D.C.*, x, no. 1–3, January–March, 1922, pp. 37–38.

Various errors in classification occurring in papers by the present authors and Dyar [*R. A.E.*, B, ix, 72] are here corrected, and a new table is given that includes all the known species of *Goeldia*, except *G. lineata*, Lutz, and *G. paranensis*, Brèthes, the position of which is uncertain.

HIRST (S.). **On some New Parasitic Mites.**—*Proc. Zool. Soc., London*, 1921, pt. 4, January 1922, pp. 769–802, 28 figs.

Besides numerous species found on birds, the new mites described include: *Liponyssus chiropteralis*, n. n., on bats and rodents from England, Sardinia, Algeria and Palestine; *L. madagascariensis* on *Lemur mongoz albifrons* from Madagascar; *L. sternalis* on a bat from Salonika; *L. aethiopicus* and *L. nyassae* on elephant shrew from Nyasaland; *L. sciurinus* on squirrels from France; and *L. confucianus*, n. n. (*berlesei*, Hirst) [*R. A.E.*, A, ix, 196.]

A key is given to the females of *Liponyssus* in the British Museum collection.

LEGER (M.) & BAURY (A.). **La Musaraigne,** *Crocidura stampflii* **et la Peste au Sénégal.**—*C. R. Hebdom. Acad. Sci., Paris*, clxxiv, no. 6, 6th February 1922, pp. 423–426.

The shrew, *Crocidura stampflii*, forms a local reservoir of the virus of plague at Dakar. It is found in nearly all native habitations, and although chiefly insectivorous, it also feeds on refuse. The plague flea, *Xenopsylla* (*Pulex*) *cheopis*, was found in abundance on these animals.

Previous records of this insectivore in connection with plague are reviewed [*cf. R. A.E.*, B, v, 98; vi, 11, 103].

FRANCIS (E.) & LAKE (G. C.). **Tularaemia Francis 1921. iv. Transmission of Tularaemia by the Bedbug,** *Cimex lectularius*.—*Pub. Health Repts., Washington*, xxxvii, no. 3, 20th January 1922, pp. 83–95.

Many further experiments to determine the means of transmission of tularaemia are described [*R. A.E.*, B, ix, 188, 189]. The authors' summary is as follows:—

The common bed-bug, *Cimex lectularius*, transmitted tularaemia from infected to healthy mice in ten instances, in which the intervals

which elapsed between biting the infected and biting the healthy mice were a few seconds, 18 hours, 7 days, 15 days and 71 days. The exact parts played by bites and by faeces in the ten transmissions are impossible of determination. White mice readily eat living and dead bugs. White mice that eat infected bugs usually contract tularaemia. Of 20 white mice that each ate one infected bug, 14 died from acute tularaemia. The average length of time from the date of infection of the 14 bugs until they were eaten was 65 days. Three white mice which each ate a bug infected 100 days previously died 5, 4 and 5 days later from tularaemia. Guinea-pigs apparently do not eat bugs intentionally. Those bitten by infected bugs failed to contract tularaemia, with one exception ; in that instance the guinea-pig probably ate one infected bug unintentionally and thereby contracted the infection. The fresh faeces of bed-bugs, which were infected with *Bacterium tularense* by sucking the blood of infected white mice and which were fed every ten days thereafter on the blood of healthy white mice, contained virulent organisms of this infection at all times, and did so up to 120 days after the date of infection of the bugs. Faeces of infected bed-bugs deposited on filter papers at least 46 days after the dates of infection of the bugs and subsequently dried for 20 days, contained virulent organisms of *Bacterium tularense* at the end of that time. In spite of these facts, the fresh faeces of infected bed-bugs have always failed to infect white mice or guinea-pigs which ate those faeces. *Bacterium tularense* suffered no apparent diminution of virulence by reason of long residence in bed-bugs.

Francis (E.) & Lake (G. C.). **Tularaemia Francis 1921. V. Transmission of Tularaemia by the Mouse Louse,** *Polyplax serratus* **(Burm.)**.—*Pub. Health Repts., Washington,* xxxvii, no. 3, 20th January 1922, pp. 96–101.

The authors' summary of experiments with *Polyplax serratus* in the transmission of tularaemia is as follows :—

The transmission of tularaemia was effected in 12 out of 17 attempts through the agency of the mouse louse, *Polyplax serratus*, by the transfer of lice from white mice dead of tularaemia to healthy white mice, the intervals elapsing between infestation of the healthy mice and their death varying from 5 to 12 days, the average being $7\frac{1}{4}$ days. The number of lice transferred in the 12 successful attempts varied from 12 to 43, the average being 25. The intervals which elapsed between the deaths of infected mice and the transfer of their lice to healthy mice varied from a few minutes to 18 hours. Transmission of tularaemia by lice was thus effected to two series of mice, the first series being infected by lice removed from inoculated mice, and the second series being infected by lice removed from the louse-infected mice of the first series. When inoculated mice were dropped into a jar in contact with lousy healthy mice, the infection killed off all the healthy mice in 25 days. Transmission in this case was probably due to the lice. Blood-sucking mites, *Liponyssus isabellinus*, removed from an infected white mouse, were crushed and injected subcutaneously into another white mouse, causing its death from tularaemia. The urine of infected white mice was infective to guinea-pigs when injected subcutaneously into the latter. Similar urine failed to infect white mice when fed to them on maize meal.

Fiske (W. F.). **Report of Entomologist.**—*Uganda Protectorate : Ann. Med. & Sanit. Rept. 1920, Entebbe,* 1921, pp. 49–63. [Received 26th February 1922.]

Attention was devoted throughout the year to the Victoria Nyanza Sleeping Sickness area. The work and experiments undertaken may be included under the following headings : thorough general inspection of the proscribed zone to ascertain the actual conditions at present, and the extent to which the Sleeping Sickness Rules are irregularly relaxed ; the regularisation, by amendment of rules, of existing relaxations wherever they are of long standing and no harm can be shown to have resulted ; the granting of extensive privileges in all parts of the infected area in accordance with rules as thus amended ; the enforcement of the amended rules strictly ; the extermination of tsetse-fly (*Glossina palpalis*) through clearing of foreshore ; the utilisation of fuel from clearings ; the maintenance of clearings by clean culture and by close grazing ; and the revival of the fishing industry under sanitary conditions.

The activities reported herein, which should be read in the original as they are unsuitable for an abstract, are the result of conclusions reached through two-and-a-half years' research ; they are regarded by the author as an experiment in the reclamation of territory infested by the tsetse-fly and are designed to serve as a guide and precedent for future operations.

Glossina palpalis is not, as previously assumed, a natural parasite of man, but its preferred hosts are reptiles. Tsetse-flies do not increase and spread with the increase and extension of population, but only with the decrease and restriction of population. Sanitation of the lake area against sleeping sickness can have no other object than to permit its repopulation and the economic development of its natural resources. These operations should be conducted in such a way as to bring about the maximum destruction of the fly with a minimum exposure of the population to the fly during the process. It requires full knowledge of the bionomics of the insect in order to direct and supervise the reclamation and repopulation of the closed area in this manner. A successful outcome would be assured but for one circumstance, and that is the present absence of sleeping sickness in the area, and the consequent unwillingness of the population to undertake the necessary precautionary measures.

Sergent (Et. & Ed.). **Etude expérimentale du Paludisme des Oiseaux. Un même Lot de Moustiques peut infecter successivement 3 Sujets.** —*C. R. Soc. Biol., Paris,* lxxxvi, no. 7, 18th February 1922, pp. 349–350.

Experiments are described in which an individual of *Culex pipiens* fed only once on a bird infected with *Plasmodium relictum* was able to transmit it to three uninfected birds in succession.

Metalnikow (S.). **Les Changements des Eléments du Sang de la Chenille** (*Galleria mellonella*) **pendant l'Immunisation.**—*C. R. Soc. Biol., Paris,* lxxxvi, no. 7, 18th February 1922, pp. 350–352.

The changes occurring in the blood of the larvae of *Galleria mellonella* during immunisation are discussed. The injection of micro-organisms produces a strong reaction of all the free cells of the blood. The phagocytes decrease within one to two hours after injection, whereas

the leucocytes and proleucocytes increase up to 80–90 per cent. Leucocytolysis and phagocytolysis occur, causing the liberation of ferments and intracellular antibodies.

Yakimoff (W. L.) & Miller (G. A.). **Les Protozoaires de l'Intestin de l'Homme en dehors de l'Organisme de l'Homme. L'Examen de l'Intestin du** *Periplaneta orientalis.*—*Bull. Soc. Path. Exot., Paris*, xv, no. 1, 11th January 1922, pp. 8–11.

Of the various animals capable of polluting water and food at Petrograd cockroaches occur in great abundance. An examination of the intestine of *Blatta* (*Periplaneta*) *orientalis* showed it to be heavily infested with flagellates and other organisms, including *Oikomonas* sp., *Monas* sp., *Nyctotherus ovalis, Oxyurus diesingi, Blastocystis, Lophomonas striata, L. blattae* and *Entamoeba blattarum.*

The females carry the highest percentage of infection.

Franchini (G.). **Sur un Trypanosome du Latex de deux Espèces d'Euphorbes.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 1, 11th January 1922, pp. 18–23, 1 fig.

Flagellates of the type of *Herpetomonas* and spirochaetes have previously been described from the latex of species of *Euphorbia* [*R.A.E.*, B, ix, 58, 106, 120]. During the hot summer of 1921 in Italy, definite trypanosomes and a series of other forms have been found that have completed the earlier researches. The types of trypanosome discovered are described, the developing stages resembling those of *T. cruzi* or of *Cystotrypanosoma intestinalis*, which was described by Roubaud from a species of *Lucilia* in French West Africa. Although having certain affinities with the trypanosomes of insects described by Chatton and Alilaire, Patton, Roubaud and others, it also seems to offer some resemblances of development with certain trypanosomes of vertebrates. It is therefore treated as a new species, and named *T. euphorbiae.*

From examinations of many insects collected from plants in the Botanical Gardens of Florence, lists have been compiled of those that harboured flagellates in their digestive tracts. França, in Portugal, suspected *Stenocephalus agilis* of being the transmitting agent of flagellosis of *Euphorbia* because he found it on *Euphorbia* plants and discovered flagellates in its intestine, salivary glands and proboscis. The same discoveries have not been made in Italy, where, however, it has been shown that many other insects harbour flagellates in the same organs. In fact, some of the phytophagous insects captured near the two species of *Euphorbia* known to be infested with trypanosomes harboured *Herpetomonas* or *Crithidia*, though none of them showed trypanosomes. Among the non-phytophagous or only occasionally phytophagous insects, however, a certain number harboured in their digestive tract not only *Herpetomonas* and *Crithidia* but trypanosomes also. In particular, trypanosomes are recorded from certain Muscids and from *Anopheles maculipennis.*

Schwetz (J.). **La Présence de Pupes de** *Glossina palpalis* **à 1·500 m. de l'Eau.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 1, 11th January 1922, pp. 23–25.

Further evidence is adduced to show that *Glossina palpalis* can occur and breed permanently in certain districts of the Belgian Congo at considerable distances from water [*cf. R.A.E.*, B, viii, 68].

SÉGUY (E.). **L'*Aëdes jugorum*, Vill., et les Larves de Moustiques à Branchies très devéloppées.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 1, 11th January 1922, pp. 25–28, 1 fig.

The highly developed gills discussed in this paper appear to be the characteristic of mosquito larvae that are non-predacious and have a rapid development. They are found in small collections of water that evaporate rapidly or else in water containing a large amount of decomposing matter.

The mosquitos coming within this group include *Aëdes argenteus*, Poiret, *A. alpinus*, L. (*nigripes*, Zett.), *A. geniculatus*, Oliv., *A. echinus*, Edw., and *A. jugorum*, Vill. The last named occurs in the mountains of central and western Europe. Recently *A. gallii*, Mart., has been considered synonymous with it, but examination of the larva of *A. jugorum*, a description of which is given, renders the identity of these two species doubtful.

SERGENT (Edm. & Et.), PARROT (L.) & FOLEY (H.). **L'Armature maxillaire des *Anopheles maculipennis* en Pays paludéen.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 1, 11th January 1922, pp. 29–30, 1 fig.

In view of Roubaud's statement [*R.A.E.*, B, x, 53] that the number of teeth on the maxillae of mosquitos has a relation to the intensity of malaria, observations have been carried out in Algeria which, however, do not support this theory. Of 1,222 individuals examined, the proportion of Anophelines bearing more than 14 "teeth" was 46·4 per cent., the general average number of teeth being 14·4. The number of teeth on the two maxillae varied in about half the females of *Anopheles maculipennis* examined, the number differing by as many as three in some cases.

LANGERON (M.). **Sur L'Anophélisme et le Paludisme en France.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 1, 11th January 1922, pp. 30–36.

Various theories have been propounded in explanation of the regression of malaria in France. The theory that *Anopheles maculipennis* has gradually acquired a preference for the blood of animals to that of man is not considered to be sufficiently definitely established. The numbers on which the theory is based are not large enough to eliminate the factor of individual variations. The reason why mosquitos are found in large numbers in stables, etc., is probably because these places afford the necessary dark and hygrometric conditions, whereas human habitations may be too dry and well ventilated ; this, however, does not necessarily mean that they do not attack man. With reference to the attraction for Anophelines attributed to rabbits, no individuals were found where these animals were kept in wooden hutches in a high stable well lighted and ventilated. It is thought that such an adaptation of the dentition as suggested by Roubaud [*R.A.E.*, B, x, 53] is hardly possible in such short a period, the regression having begun before 1897, whereas between 1828 and 1860 the conditions were very bad. By supplying an abundance of food in the form of animal blood, oviposition and the consequent increase in numbers of mosquitos is stimulated. The regression of malaria is considered to be chiefly due to the systematic draining of deep ponds, the establishment of better roads, the more hygienic manner of housing, as well as an abundance of suitable food including

meat and wine. The successful quinine treatment in France is compared with the contrary results obtained with the same treatment in Algeria, the result being apparently due to climatic differences. Without completely denying the protective rôle played by cattle, the author considers it to be very limited and also counteracted by the supply of nourishment afforded to the Anophelines.

In certain parts of France where the *Anopheles* question is not a formidable one in itself, malaria may be almost completely eradicated by the amelioration of the living conditions of the population and the administration of quinine.

Roubaud (E.). **A Propos des Races zoophiles d'Anophèles.**—*Bull. Soc. Path. Exot., Paris,* xv, no. 1, 11th January 1922, pp. 36–39.

The deductions made by the author in his previous paper [*R. A.E.*, B, x, 53] were only meant as an indication of the conclusions arrived at as a result of those particular observations and should not be in any way considered as final. The observations of Sergent, Parrot and Foley [*R. A.E.*, B, x, 100], although carried out on a very much greater number of individuals, do not appear to overthrow the author's theory. Among those mosquitos attacking chiefly man the greater proportion of individuals appear to have less than 14 "teeth" on the maxilla. Attention is drawn to the fact that although there is such a difference in the numbers examined (1,222 as against 36) in Algeria and by the present author, the actual variation is only very slight. That the theory is not verified in Algeria can only be accepted after an accurate comparison of further observations in different regions has been made, the averages thus obtained having a more definite value. A uniform method of counting "teeth" must also be accepted. The present author has ignored the tooth-like projection frequently occurring at the base of the saw at a variable distance from it, and in the case of the numbers varying on each maxilla the average has been taken.

In answer to the objections raised by Langeron in the preceding paper the author, after referring to a previous paper [*R. A.E.*, B, viii, 141], states that malarial infection is not generally in proportion to the relative abundance of Anophelines. For instance in Corsica, Macedonia, Algeria, etc., where malaria is prevalent, there are relatively few mosquitos, whereas in France, where the relations between Anophelines and animals are more normal and constant, there is very little malaria in spite of the large number of mosquitos.

Cultivation of the soil, systematic draining, etc., undoubtedly reduce malaria, but not as a result of a reduction in the number of mosquitos. By reclaiming all land into a definite drainage system the breeding places become defined and limited and also more constant. These modifications are important, as they enable the females to stabilise their preference for animal hosts and thus increase the influence of natural selection. Mosquitos breeding at a distance from their food-supply are in consequence in urgent need of a blood meal and are therefore unable to show any preference for any particular host, as they would be able to do under the above conditions.

Delanoe (P.). **Au Sujet d'un Piège à Puces.**—*Bull. Soc. Path. Exot., Paris,* xv, no. 1, 11th January 1922, pp. 39–41.

The flea trap here described consists of a fairly large receptacle containing water covered with oil. The water is not essential, and

is only used to economise in oil. In the centre of the receptacle a night light is placed. The fleas are attracted to the light and fall back into the oil and are thus destroyed. In one locality in Morocco an average of 300 fleas were caught nightly by this means. All those examined proved to be *Pulex irritans*, L. For the successful action of this trap it is essential that the light afforded by it is the only source of illumination, and that there should be no suitable hiding-places.

YAKIMOFF (W. L.). **Contribution à l'Etude des Ixodidés de Russie.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 1, 11th January 1922, pp. 41–46.

This list of ticks occurring in Russia includes particulars of their geographical distribution and the hosts attacked. Those recorded as vectors of blood parasites are: *Ixodes ricinus*, transmitting *Piroplasma bigeminum*, in the north of Russia; *Rhipicephalus bursa*, transmitting *Babesia* (*P.*) *ovis*, in the Caucasus; *Margaropus calcaratus*, transmitting *P. bigeminum* and *Theileria annulata*, in Transcaucasia; *Hyalomma aegyptium*, probably transmitting *Nuttalia equi*, in south Russia; *Dermacentor reticulatus*, transmitting *P. caballi*, in central Russia, and *Nuttalia ninense* in Saratov; *Argas persicus*, transmitting *Spirochaeta gallinarum* and *S. anserina*, in South Russia; and *Ornithodoros tholozani*, transmitting *S. persica* to man, in Transcaucasia.

PARROT (L.). **Recherches sur l'Etiologie du Bouton d'Orient (Clou de Biskra). Etudes sur la Biologie des Phlébotomes en Milieu endémique.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 1, 11th January 1922, pp. 80–92.

The species of *Phlebotomus* in the El Kantara-Biskra region are: *P. papatasii*, Scop., *P perniciosus*, Newst., *P. sergenti*, Parr., and *P. minutus* var. *africanus*, Newst.

The more important of those species from the point of view of Oriental sore are *P. papatasii* and *P. minutus africanus*. These species appear to be least numerous between the end of June and the end of August. *P papatasii* generally occurs in the vicinity of human habitation or near animals, but these conditions do not apparently have the same attractions for *P. minutus africanus*. Both species have a marked preference for dark, sheltered corners of rooms, etc. The proximity of vegetation, such as gardens, appears to favour intensive breeding of *P. papatasii* either as a result of the increased humidity or other conditions favouring multiplication. This species will attack fowls and pigeons but could not be induced to feed on geckos, and is apparently exclusively a feeder on warm-blooded vertebrates. *P. minutus* var. *africanus*, on the other hand, feeds almost entirely on geckos, etc., and should it become infected with leishmaniform bodies from these reptiles, it does not transmit them to man.

The examination of both these species for the presence of intestinal flagellates proved negative. Subsequent experiments have, however, proved *P. papatasii* to be a transmitter of Oriental sore [*R.A.E.*, B, x, 39].

ABBATUCCI (S.). **La Paludisme dans ses Rapports avec la Situation économique de la Corse.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 1, 11th January 1922, pp. 92–98.

The history of Corsica with reference to the lack of sanitation and the existence of malaria, especially inasmuch as these conditions

influence the economic importance of the country, are reviewed. The recrudescence of malaria and its reappearance in certain districts that appeared to be free from it are considered to be somewhat analagous with the observations of Sergent in Algeria [*R. A.E.*, B, x, 49, 50, 70].

SCHLUPP (W. F.). **Fumigation with Sulphur.**—*Jl. Dept. Agric., Union S. Africa, Pretoria*, iv, no. 2, February 1922, pp. 132–140.

Although sulphur as a fumigant is decidedly inferior to cyanide and carbon bisulphide, its comparative safety and cheapness renders it more suitable for use by inexperienced persons and in isolated places where the use of other fumigants is impracticable

To be effective sulphur should be used in very tightly sealed rooms at the rate of 3 lb. per 1,000 cubic feet, and the fumigation continued for at least 24 hours. Under these conditions poultry mites, *Dermanyssus gallinae*, were killed, but not fowl ticks, *Argas persicus*, against which hydrocyanic acid gas has proved even less effective. Against bed-bugs [*Cimex*] sulphur is fairly effective provided that the above conditions are adhered to. It also apparently destroys the eggs, but is less reliable than cyanide, and a second application should therefore be made from two and a half to five weeks after the first.

LAMBORN (W. A.). **The Mosquitos of some Ports of China and Japan.**—*Bull. Ent. Res., London*, xii, pt. 4, February 1922, pp. 401–409.

The enquiry into the distribution and prevalence of the yellow fever mosquito, *Aëdes argenteus*, Poir. (*Stegomyia fasciata*, F.), in certain Far Eastern ports, which was begun in 1915 [*R. A.E.*, B, viii, 113], has been continued by a further survey, including the ports of Fuchow, Shanghai, Nagasaki, Kobe and Yokohama. Lists are given of the mosquitos found at each of these places, with notes on their breeding-places and on the climate, situation and conditions in which they occur.

The survey has confirmed the opinion formed in consequence of the above-mentioned investigation, that the conditions in the ports of China and Japan would prove to be unfavourable for the propagation of *A. argenteus*, even in the warmer months. There have been isolated records of its occurrence in Kowloon and in Formosa, indicating that occasional individuals may find their way north, but as a factor in the spread of yellow fever they would appear to be negligible. The possibility of the establishment of yellow fever in the ports visited seems to depend on the potentiality of *Aëdes* (*Stegomyia*) *albopictus* and perhaps *Aëdes togoi* and *A. japonicus* as vectors ; in Shanghai, and probably also in Fuchow, these species are not found during the colder months, though in Japan, which has a milder climate, the adults might be active throughout the year.

PATTON (W. S.). **Notes on the Species of the Genus *Musca*, Linnaeus. Part I.**—*Bull. Ent. Res., London*, xii, pt. 4, February 1922, pp. 411–426.

The data relating to the germ-transmitting capacity of *Musca domestica*, L., and its allied species are very incomplete, in spite of the importance of these flies as carriers of the bacilli of enteric fever,

cholera and dysentery, as well as other pathogenic organisms, especially the virus of trachoma. It has generally been accepted that the house-fly found throughout the world, and especially in tropical countries, is always *Musca domestica*, but the author is not of this opinion, basing his disagreement on structural differences. It is quite possible, however, that *M. domestica* may have been carried to all the ports of the world and has now become established there. There are many other species of the genus *Musca* that have a distinct influence on the health of stock animals, such as *M. autumnalis*, for example, which feeds on blood and serous and other pustular discharges, and is exclusively an outdoor insect. Such species frequently follow the true biting flies, sucking up any remains of blood from their punctures ; though what their germ-carrying capacity may be is not yet known.

The author divides the genus *Musca* into two groups : (1) the house-fly group, and (2) the wild species group. Under the first are included all those species that are cosmopolitan in habit, but are mainly found in and about human dwellings. The most important species are *M. domestica*, in both typical and atypical forms, *M. nebulo* and *M. humilis*. In the second group are *M. pattoni* and other species found only on animals or plants in the open or on cow-dung. They are all intermittent feeders, flitting from one animal to another, hence their importance as possible carriers of trypanosomes such as those causing nagana and surra. These haematophagous species abound in all tropical countries and can always be caught on animals as well as on dead game. All the Indian species studied breed in cow-dung.

Preliminary studies of the Oriental species are recorded. Those dealt with include *M. nebulo*, F. (*determinata*, Wlk.) ; *M. domestica*, L. (atypical form), many synonyms being given which the author believes will prove to be this atypical form of the species ; *M. humilis*, Wied., of which the synonyms include *eutaeniata*, Big., and *promisca*, Awati ; *M. pumila*, Macq. (*vetustissima*, Wlk.) ; *M. ventrosa*, Wied. (*kasauliensis*, Awati, and *hilli*, J. & B.) ; *M. albomaculata*, Macq. (*setigera*, Awati) ; *M. pattoni*, Aust. (*spinosa*, Awati) ; *M. gibsoni*, Patton & Cragg (*latiparafrons*, Awati) ; *M. spinohumera*, Awati, which is haematophagous in habit ; *M. bezzii*, Patton & Cragg (*pilosa*, Awati) ; *M.* (*Pristirhynchomyia, Philaematomyia*) *lineata*, Brun. ; *M. cingalaisina*, Big. (*pollinosa*, Stein, and *indica*, Awati) ; *M.* (*Ptilolepis*) *inferior*, Stein (*Philaematomyia gurneyi*, Patton & Cragg) ; *M.* (*Philaematomyia*) *crassirostris*, Stein (*insignis*, Aust.).

Awati, in mentioning *M. corvina* as a synonym of his *M. spinohumera*, evidently refers to Portchinsky's *M. corvina*. Portchinsky, however, recognised two types of *M. corvina* in Russia, namely, *M. corvina ovipara*, found only in North Russia, and *M. corvina vivipara*, found only in the Crimea. Portchinsky appears to have given no description of the larviparous species in any of his writings, and, as Schnabl and Dziedzicki partly describe the male, the species must in future be known as *M. larvipara*, Schnabl & Dziedzicki, and not Portchinsky.

The Australasian species dealt with include *M. domestica*, L., (typical form), with synonym *M. vicaria*, Wlk. ; *M. domestica* (atypical form), with synonym *M. antiquissima*, Wlk. ; *M. pumila*, Macq. ; *M. terra-reginae*, J. & B. ; *M. ventrosa*, Wied. ; *M. convexifrons*, Thoms. (*fergusoni*, J. & B.).

The species of *Musca* from the Ethiopian region will be dealt with in a subsequent paper.

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Munro (H. K.). **The Sheep Blow Fly.**—*Jl. Dept. Agric., Union S. Africa, Pretoria*, iv, no. 2, February 1922, pp. 173–175.

A brief account is given of the injury to sheep wool as a result of attacks by blow-flies, and the methods adopted for dealing with these pests in Australia. They also occur in the Union of South Africa, but how many species are noxious is not yet definitely known.

James (S. P.). **Mosquito Life in Surrey during 1921.**—*Bull. Ent. Res., London*, xii, pt. 4, February 1922, pp. 427–428.

MacGregor's paper [*R. A. E.*, B, x, 16] has led the author to examine his records for Surrey in 1921. In certain areas, his experience of the scarcity of some kinds of mosquitos is the same, but there are others in which the findings differ. For example, in some parts of Surrey *Anopheles bifurcatus* was obtained without difficulty throughout the year. Larvae of *A. plumbeus* and *Aëdes* (*Finlaya*) *geniculatus* were collected from tree-holes on many occasions after the middle of August. The incidence of *Theobaldia annulata* and *Aëdes punctor* var. *meigenanus* (*Ochlerotatus nemorosus*) also differed from that in MacGregor's area. In June a larva of *Aëdes cinereus*, which is not included in MacGregor's list, was collected within a few miles of his area.

As regards *Anopheles maculipennis*, MacGregor records that when nearly all available breeding-places were dry there was an increase in the actual numbers of larvae found in the remaining ones. Observations in Surrey and Kent indicate that the presence of permanent breeding-places of various kinds explains the difference between the records for the two areas studied. In India, where long periods of drought occur annually, the relative importance of permanent and temporary breeding-places has been worked out in detail. Christophers pointed out in 1911 that in the Punjab, however hard pressed by drought some of the mosquitos may be in a particular part of any area, it is always possible to find, within their usual distance of spread, some permanent collections of water in which they are breeding freely. Also, when temporary breeding-places reappear, the various species spread widely from these permanent sources until they are shortly to be found again throughout the area. This explains the well-established Indian observation that a particularly dry year has no permanent effect in reducing the numbers of Anophelines. As some permanent breeding-places exist within a few miles of the area reported upon by MacGregor, a probable answer, based upon Indian experience, can already be given to his question as to whether the species dealt with will be rare in the same locality during future years.

Austen (E. E.). **Some Siamese Tabanidae.**—*Bull. Ent. Res., London*, xii, pt. 4, February 1922, pp. 431–455, 7 figs.

Very little in the way of collection of Diptera has been done in Siam, and the present paper does not claim to be anything like complete; it is published, however, to facilitate the study of Siamese Tabanids and to arouse interest among other workers. The new species described are *Tabanus barnesi*, *T. insidiator*, *T. praematurus*, *T. rubicundulus*, *T. virgulatus*, *T. pugnax*, *T. pugiunculus*, and *T. agnoscibilis*. A key is given to the females of the fourteen species of *Tabanus* recorded from Siam.

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Pomeroy (A. W. J.). **New Species of African Simuliidae and Further Studies of the Early Stages.**—*Bull. Ent. Res., London,* xii, pt. 4, February 1922, pp. 457–463, 2 plates.

The new species are *Simulium hirsutum,* described from individuals reared from pupae found attached to grass blades in a swift mountain stream in Tanganyika Territory—examples slightly differing from this species, taken in Zanzibar from grass blades in a small stream, are described from pupae only as *S. hirsutum* var. *dubium* and var. *adersi* ; *S. alcocki,* described from individuals reared from pupae attached to grass blades in a slow-moving stream in Nigeria, with pupal varieties described as var. *violaceum* and var. *coalitum* ; *S. divergens,* from the same habitat ; *S. vorax,* described from females taken engorging on a donkey in Tanganyika Territory; and *S. palmeri,* described from examples bred from pupae found in a swift hill-stream at an altitude of 900 feet in Nigeria.

Pawan (J. L.). **On the Eggs and Oviposition of** *Psorophora* (*Janthinosoma*) *posticata,* **Wied. (Culicidae.)**—*Bull. Ent. Res., London,* xii, pt. 4, February 1922, p. 481, 1 plate.

The mosquito, *Psorophora posticata,* Wied. (*Janthinosoma musica,* Say) generally oviposits in the rain-water that accumulates in the broken cacao pods strewn in heaps about the cool shady parts of the cacao fields of Trinidad. The eggs lie in circular or subquadrate masses, of from 25 to 40 in number, floating on the surface, the exposed portion assuming in less than half an hour a dark steel-blue appearance, the whole mass of eggs simulating a honeycomb. The larva hangs with its head downwards in the floating egg, and in from 8 to 10 hours after oviposition ruptures the lower, submerged portion, and escapes into the water.

Balfour (A.). **Report on Communicable Diseases in Port Louis.**—*Mauritius,* Govt. Printer, 1921, 20 pp.

In the section on malaria in this report it is suggested that large scale experiments might be made to see if *Culex tigripes* will destroy the broods of *Anopheles costalis* in places where this Culicine does not naturally exist. *C. tigripes* is largely a forest mosquito, which may not be adaptable to other surroundings, and may, moreover, thrive only under certain climatic conditions. Its larvae are not effective in places where Anophelines and " millions " coexist, for the fish, which cannot get at the Anopheline larvae on account of the presence of algae, destroy those of *C. tigripes.*

Balfour (A.). **Report on Sanitary Matters in the Districts of Rivière du Rempart and Flacq.**—*Mauritius,* Govt. Printer, 1921, 11 pp., 1 plan.

In Rivière du Rempart, *Anopheles costalis,* Loew, disappears in many localities during the winter, and it is possible that the females hibernate. It is difficult to find any place where this mosquito congregates, as it is in no sense of the word a domestic species. It may possibly find shelter near marshes or in woods or undergrowth. Its sudden disappearance and equally sudden appearance in many places where fever is only rife in summer are not, however, easily accounted for

if hibernation does not occur. It may, perhaps, spread rapidly from the places where it does breed all the year round. If there is no hibernation, the broods are best dealt with in the cold season, when breeding-places are few and scattered. The question is a crucial one, in the author's opinion, and if there is a difficulty in solving it the services of an expert entomologist are advisable.

KUDO (R.). **Studies on Microsporidia, with Special Reference to those Parasitic in Mosquitoes.**—*Jl. Morphology, Philadelphia, Pa.*, xxxv, no. 1, March 1921, pp. 153–182, 5 plates.

New Microsporidia infecting mosquitos and obtained near Urbana, Illinois, are described. *Thelohania magna* infects the adipose tissue of the larva of *Culex pipiens*. It is rare and found only in a limited area. Heavy infections appear to be fatal. *T. illinoisensis*, which is rarer, infects the adipose tissue of the larva of *Anopheles punctipennis*. The possibility of using such parasites as a means of destroying mosquito larvae is suggested.

MCCORNACK (P. D.). **Paralysis in Children due to the Bite of Wood-ticks.**—*Jl. Amer. Med. Assoc., Chicago, Ill.*, lxxvii, no. 4, 23rd July 1921, pp. 260–263.

Bites of wood-ticks, *Dermacentor venustus*, Banks, can cause a motor paralysis of the flaccid type in human beings, children being the most commonly affected. Death may occur, usually owing to respiratory paralysis.

NAGAYO (M.), MIYAGAWA (Y.), MITAMURA (T.), TAMIYA (T.) & TENJIN (S.). **Five Species of Tsutsugamushi (the Carrier of Japanese River Fever) and their Relation to the Tsutsugamushi Disease.**—*Amer. Jl. Hyg., Baltimore, Md.*, i, no. 5–6, September–November 1921, pp. 569–591, 8 plates.

There are at least five species of mites defined as tsutsugamushi. These are here discussed in detail and the points of distinction between them described. They are *Trombicula akamushi*, Brumpt, *T. pallida*, Nagayo, *T. palpalis*, Nag., *T. intermedia*, Nag., and *T. scutellaris*, Nag. For the present the generic name *Trombicula* is adopted instead of *Leptotrombidium* proposed in a previous paper. Whether the latter is to be regarded as a synonym of the former or is to be treated as a subgenus depends on further investigation. Practically only one species, *T. akamushi*, is of importance in the occurrence of human tsutsugamushi disease, which occurs only in the season in which the development of the larvae of *T. akamushi* takes place. The geographical distribution of the disease also corresponds to that of *T. akamushi*, not to that of the other species. So-called endemic districts may be recognised by detecting the presence of *T. akamushi*, and this demarcation of dangerous localities is of value both in carrying out preventive measures and also from a financial point of view in agriculture.

ALLEN (A. H.). **Mosquito Eradication.**—*U.S. Naval Med. Bull., Washington, D.C.*, xvi, no. 1, January 1922, pp. 1–8, 4 plates, 1 map.

The work described was done at the Philadelphia Navy Yard, where mosquitos have been very prevalent in summer, by oiling and ditching, pending the filling in of land where pools form.

The principal species of mosquitos in Southern Philadelphia are: *Culex pipiens, C. saxatilis, Aëdes sollicitans, A. sylvestris, A. canadensis, Psorophora ciliata* and *Anopheles punctipennis.* The last-named is not numerous; it breeds along streams, around blades of grass, and in rain barrels. *C. pipiens* is the ordinary house mosquito. *C. saxatilis* has the same breeding-places (flower-pots, milk bottles, and other accidental water containers). *Aëdes sollicitans* and *A. sylvestris* breed in brackish water and salt water marshes. *A. canadensis* is a large woodland species imported from Michigan in shipments of lumber in 1917; it is found in spring and breeds in hollow logs, under dead leaves, etc. *P. ciliata* is the first mosquito to appear and disappear, and its occurrence is always an indication that other species are present, as it preys upon all of them until they are exterminated, when it resorts to cannibalism. It breeds in ditches and stagnant water. At Philadelphia it occurs from March to November.

RANDIER (P.). **La Chloropicrine. Ses Propriétés physiques et chimiques, sa Toxicité vis-à-vis des Etres vivants, ses Applications. Chloropicrinage du Navire Atelier russe "Kronstadt."**—*Arch. Méd. & Pharm. Nav., Paris*, cxii, no. 1, January–February 1922, pp. 56–78.

From the results obtained in fumigating a Russian vessel of 16,000 tons, chloropicrin seems to be eminently suitable for naval conditions. About 650 lb. of chloropicrin was used, and a total destruction of cockroaches, fleas and bugs was effected.

SERGENT (Ed.) & DONATIEN (A.). **Les Stomoxes, Propagateurs de la Trypanosomiase des Dromadaires.**—*C.R. Hebdom. Acad. Sci., Paris*, clxxiv, no. 8, 20th February 1922, pp. 582–584.

Stomoxys sp. is recorded as transmitting trypanosomiasis of camels in North Africa. The transmission is mechanical and has been proved experimentally. Infection only occurs when the fly attacks a healthy animal immediately after biting an infected one.

CABALLERO (A.). **Las Especies del Género** *Chara* **y las Larvas de los Mosquitos.** [Plants of the Genus *Chara* and Mosquito Larvae.] —*Anales Inst. General y Técnico de Valencia*, no. 10, pp. 5–17. (Abstract in *Trop. Dis. Bull., London*, xix, no. 2, February 1922, p. 113.)

The author has satisfied himself in the field that three species of *Chara*, namely *C. foetida, C. contraria* and *C. hispida,* possess the power of destroying mosquito larvae [*cf. R.A.E.*, B, viii, 61].

Taliaferro (W. H.). **Variation and Inheritance in Size in *Trypanosoma lewisi*. I. Life-cycle in the Rat and a Study of Size and Variation in " Pure Line " Infections. II. The Effects of Growing " Pure Lines " in Different Vertebrate and Invertebrate Hosts and a Study of Size and Variation in Infections occurring in Nature.**—*Proc. Nat. Acad. Sci. U.S.A., Washington, D.C.*, vii, nos. 5 & 6, May & June 1921, pp. 138–143 & 163–168, 2 figs.

Trypanosoma lewisi reaches an " adult " stage in its development in the rat in about 25 days after it appears in the blood. After this stage is reached there is practically no division or growth, as a result of which the organisms show a very low coefficient of variation in " pure line " infections, provided they are measured after the " adult " stage is reached. Passages of the " pure line " from rat to rat are not followed by any significant changes in the coefficient of variation, whereas passage through the flea results in a marked increase in the coefficient of variation, showing that the " pure line " breaks up into diverse lines following such passage. In nature probably a large number of " pure lines " occur, differing among themselves, but each of which is constant in size.

Peters (B. A.). **Bile Salt as a Vehicle for a Pediculicide.**—*Brit. Med. Jl., London*, no. 3190, 18th February 1922, p. 264.

As bile salts are stated to assist the passage of fat emulsions through the mucous membranes by reducing surface tension, it was thought that they might have the same effect on the covering of eggs of lice [*Pediculus humanus*]. A compound of 10 gm. sodium taurocholate completely dissolved in water up to 950 cc., to which 50 cc. of eucalyptus oil are added, and the whole well shaken, proved effective for destroying lice on the head. Some strains of lice are apparently more resistant than others ; in some cases very heavy infestations were completely sterilised with one application, whereas other lightly infected cases required three applications. Possibly the solution of bile salts may be combined with some substance more poisonous to the eggs than eucalyptus.

Taylor (F. H.). **Australian Phlebotomic Diptera : New Culicidae, Tabanidae and Synonymy.**—*Proc. R. Soc. Victoria, Melbourne*, xxxii, pt. 2, September 1920, pp. 164–167.

The new species described are the Culicid, *Uranotaenia albofasciata*, and the Tabanids, *Silvius distinctus* and *Tabanus geraldi*, from the Northern Territory.

The new generic name *Phibalomyia* is suggested to replace *Elaphromyia*, Taylor *nec* Bigot [*R.A.E.*, B, vi, 118], as the latter is preoccupied. *Corizoneura kurandae*, Taylor [*loc. cit.*] appears to be identical with *Pseudotabanus queenslandi*, Ricardo. The names *Tabanus strangmanni*, Ric. [*R.A.E.*, B, iii, 26] and *T. mastersi*, Tayl. [*R.A.E.*, B, vi, 118] apparently both refer to the same species.

Howard (L. O.). **Report [1920–21] of the Entomologist.**—*U.S. Dept. Agric. Bur. Ent., Washington, D.C.*, 1st August 1921, 33 pp. [Received 24th January 1922.]

[Our attention has been called to an error in this report, which has been reproduced in the abstract of it [*R.A.E.*, B, x, 68]. The ointment recommended against *Hypoderma* should consist of a mixture of vaseline and *iodoform*, not iodine.—Ed.]

SURCOUF (J.). **Diptères piqueurs du Laos. (Tabanidae.) 2e Note.**—*Bull. Soc. Ent. France, Paris,* 1922, no. 1, 11th January 1922, pp. 13–15.

The new Tabanids from Indo-China are *Tabanus tonglai, T. soubiroui, T. cepuricus, T. pseudopallidepectoratus* and *T. pallidepectoratus,* Bigot, var. *aurea,* n.

BEARD (J.). **The Fowl Tick.**—*Queensland Agric. Jl., Brisbane,* xvii, pt. 1, January 1922, pp. 25–26, 1 fig.

The symptoms of spirochaetosis in fowls caused by *Argas persicus* (fowl tick) and the various remedial measures recommended are here described. The following method for preventing the ticks from gaining access to the roosting birds is said to have been in successful use for nearly two years. Four blocks of wood are sunk into the ground and into each of them is inserted a two-foot length of half-inch piping. Narrow cups, with a cap above, to hold kerol or sheep dip, are soldered on to these pipes about 6 in. from the top. The perches are then bolted above these to the tops of the supporting pipes.

BECKER (Th.) & others. **Wissenschaftliche Ergebnisse der mit Unterstützung der Akademie der Wissenschaften in Wien aus der Erbschaft Treitl von F. Werner unternommenen zoologischen Expedition nach dem Anglo-Aegyptischen Sudan (Kordofan) 1914. VI. Diptera.** [The Scientific Results of the Zoological Expedition to the Anglo-Egyptian Sudan (Kordofan) in 1914 undertaken by F. Werner through the Treitl Bequest and with the Support of the Academy of Sciences in Vienna.]—*Denkschr. Akad. Wiss. in Wien,* Mat.-Naturw. Klasse, xcviii, 1922, pp. 57–82, 6 figs.

The new Tabanids described are *Tabanus picticeps, Therioplectes subfasciatus* and *Chrysops siccus.* [According to Major E. E. Austen the first-named is a synonym of *T. taeniola,* P. de B.—ED.]

BENGTSON (I. A.). **Preliminary Note on a Toxin-producing Anaerobe isolated from the Larvae of** *Lucilia caesar.*—*U.S. Publ. Health Repts., Washington, D.C.,* xxxvii, no. 4, 27th January 1922, pp. 164–170.

An organism, the cultural and morphological characters of which are described, has been isolated from the larvae of *Lucilia caesar.* The filtrate of the organism is toxic on inoculation and also by the mouth to certain animals, and no protection is afforded by polyvalent botulinus antitoxin in inoculation tests. It varies greatly from the strains of *Clostridum botulinum.* It has been thought to be the cause of limberneck in fowls [*R.A.E.*, B, viii, 204], but its relation in this connection cannot yet be definitely stated. Further work is needed along this line, as well as on the relation of the fly, *L. caesar,* to the disease.

HEADLEE (T. J.) & CARROLL (M.). **Report of Mosquito-control Work.**—*Rept. New Jersey Agric. Expt. Sta., 1919–20, New Brunswick, N.J.,* 1921, pp. 507–514 & 520–554, 6 tables. [Received 9th March 1922.]

Particulars of the mosquito control work carried out in various areas and shipyards, a summary of the year's work, the present status

of control and an outline of future plans are given. The spring broods of salt-marsh mosquitos for 1919 caused very little trouble in the protected area.

The mosquitos observed during the year included *Aëdes* (*Ochlerotatus*) *sollicitans*, *A.* (*O.*) *cantator*, *A. sylvestris*, *Culex pipiens* and *Anopheles crucians*. The latter has not previously been reported so far north in New Jersey.

BECKWITH (C. S.). **Drainage Plans for Dismal Swamp for the Purpose of Eliminating Serious Mosquito Breeding.**—*Rept. New Jersey Agric. Expt. Sta., 1919–20, New Brunswick, N.J.*, 1921, pp. 514–516. [Received 9th March 1922.]

The survey here described was undertaken to determine if mosquito breeding in this area could be eliminated at a reasonable cost. It was ascertained that the important species of mosquito breeding in it is the fresh-water swamp mosquito [*Aëdes sylvestris*], which has been proved to have an extreme migratory range of ten miles under conditions of exceptional abundance. Studies have also shown that unless the breeding is very concentrated and the number of mosquitos emerging very large, long migrations do not take place. They also indicate that this species tends to move from the breeding-place toward the nearest centre of population. The drainage plans with their estimated cost are recorded.

Order under the Tick (Control and Eradication) Law, 1920 (Law 41 of 1920).—*Jamaica*, 10th December 1921, 1 p.

By an enactment dated 10th December 1921 under the above order [*R.A.E.*, B, ix, 47], owners of holdings on which there are cattle to the number of 100, are required to construct dipping tanks sufficient for the effective dipping of all cattle before the 1st May 1922. The construction of these tanks shall be subject to the approval of the Director of Agriculture, and any alterations that he may require are to be effected within three months of the service of such notice.

DAMMERMAN (K. W.). **Nieuwere Onderzoekingen over Malaria-Muskieten in Nederlandsch-Indië.** [Recent Researches on Malaria Mosquitos in the Dutch East Indies.]—*Teysmannia, Batavia*, xxxii, no. 1, 1921, pp. 18–30. [Received 11th March 1922.]

This article summarises the work done on Dutch East Indian Anophelines of late years and contains no new information.

GEDOELST (L.). **Le Trimorphisme larvaire des Oestridés.**—*C.R. Soc. Biol., Paris*, lxxxvi, no. 9, 4th March 1922, pp. 501–504.

The various larval stages of *Hypoderma bovis* and *H. lineatum*, as described by Laake [*R. A.E.*, A, ix, 171], and of *Gastrophilus pecorum*, as described by Boas, are reviewed. As a result of recent observations these flies are thought to have only the usual three larval stages, and that there is nothing in the above-mentioned authors' observations to prove the existence of more.

CODINA (A.). **Recull de Dípters de Catalunya. IV.** [A Review of Catalonian Diptera. IV.]—*Butlletí Inst. Catalana Hist. Nat., Barcelona,* 2nd Series, i, no. 2, February 1921, pp. 39–50. [Received 13th March 1922.]

This paper includes a list of the Tabanids found in Catalonia.

MAHEUX (G.). **Insectes nuisibles aux Animaux de la Ferme.**—*Minist. Agric. Quebec,* Bull. 67, 1920, 31 pp., 28 figs. [Received 14th March 1922.]

A brief account is given of the numerous insects attacking farm animals in Quebec. The injury caused by them is described and remedial and preventive measures are advocated.

CATANEI (A.). **Morphologie des Plasmodium dans un Accès mortel de Paludisme.**—*Bull. Soc. Path. Exot., Paris,* xv, no. 2, 8th February 1922, pp. 104–107, 3 plates.

In the peripheral blood of a native, who died of malaria in Algeria, the three forms of malaria, *Plasmodium praecox, P. vivax* and *P. malariae,* were found to be coexistent. Owing to the lack of data concerning the patient's antecedents and the possibility of simultaneous or successive infections, no conclusions can be drawn as to the confirmation or otherwise of the unicist theory respecting malaria parasites.

MARCHOUX (E.). **Multiplicité des Races dans les trois Formes de Parasites du Paludisme.**—*Bull. Soc. Path. Exot., Paris,* xv, no. 2, 8th February 1922, pp. 108–109.

The author is of opinion that not only do three species or varieties of *Plasmodium* exist, but that they form three groups containing numerous varieties. Some of the many forms recorded as distinct by other authors are enumerated. The results of immunity reactions would seem to be in favour of the theory of a multiplicity of races. Thus, natives of Senegal, though resistant to malaria in their own country, succumb to the fever in Dahomey; they may even become infected in the interior of Senegal, though remaining immune along the coast.

FRANCHINI (G.). **Sur un Flagellé nouveau du Latex de deux Apocynées.**—*Bull. Soc. Path. Exot., Paris,* xv, no. 2, 8th February 1922, pp. 109–113, 1 fig.

Flagellates have been isolated from the latex of *Funtumia elastica* and *Thevetia nereifolia* in Florence, and should apparently be included in the genus *Herpetomonas,* any differences being probably due to the unusual medium.

FRANCHINI (G.). **Sur un Flagellé de Lygaeide** (*Crithidia oxycareni,* **n. sp.**).—*Bull. Soc. Path. Exot., Paris,* xv, no. 2, 8th February 1922, pp. 113–116, 1 fig.

A new flagellate, *Crithidia oxycareni,* has been isolated from a Lygaeid bug, *Oxycarenus lavaterae,* on the Malvaceous shrub, *Althaea syriaca.* Smears of the faeces of these insects contained large, round

or oval, flagellate forms, and also small leishmaniform parasites. The flagellates were found in great numbers in the alimentary tract, and occasionally in the salivary glands and proboscis; in the latter, however, small elongated parasites without a flagellum were more common. The larvae examined were not infected. Cultures of the parasite were easily made in Nöller's medium. A white mouse inoculated with a large number of the parasites (flagellated or otherwise) taken from the digestive tract of the insect showed a few round leishmaniform parasites in blood smears 4, 8, 13 and 18 days later. By the 24th day it had to be killed, and a few free leishmaniform parasites were found post-mortem.

A few round and oval leishmaniform parasites were also found in the leaves and skin of the fruit of the plant. On the bark partly dried excrement of the insects was found to contain numerous leishmaniform parasites, and it is thought probable that in the case of plants with thinner bark, such as *Euphorbia*, these might easily penetrate the tissues and multiply in the plant.

Swellengrebel (N. H.). **Fréquence saisonnière des Anophèles impaludés aux environs d'Amsterdam.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 2, 8th February 1922, pp. 116–119.

The investigations with regard to the autumnal infection of *Anopheles maculipennis* with *Plasmodium vivax*, carried out in 1920 [*R.A.E.*, B, x, 20], have been continued in 1921, and the findings of both years are now given in a series of tables. The present observations substantiate those already noticed [*loc. cit.*]. There is no evidence that the salivary infection observed in the autumn is continued to any extent after the diminution of the infection in the intestine. Although there is no reason to suppose a hibernation of sporozoites from January to May, studies along these lines are to be carried out during those months in 1922, when it is also hoped to ascertain whether the recrudescence of intestinal infection during February–April is due to reinfection during those months or not.

Swellengrebel (N. H.). ***Myzomyia ludlowi*, Theob., parvient-elle à ressembler à *Myzomyia rossii*, Giles, quand elle vit en rapport intime avec cette dernière espèce ?**—*Bull. Soc. Path Exot., Paris*, xv, no. 2, 8th February 1922, pp. 120–122.

Although it would seem possible that *Anopheles* (*Myzomyia*) *ludlowi* and *A. subpictus* (*Myzomyia rossi*) are only modifications of one species, this is improbable since *A. ludlowi* may occur independently of *A. subpictus*, as, for instance, in Sumatra, where the latter is absent. In Java both species occur.

Jojot (C.). **Le Secteur de Prophylaxie de la Maladie du Sommeil du Haut-Nyong (Cameroun).**—*Ann. Méd. & Pharm. Colon., Paris*, xix, no. 4, October–December 1921, pp. 423–442, 1 map, 1 fig. [Received 15th March 1922.]

The prophylactic measures undertaken against sleeping sickness in Haut-Nyong (Kamerun) are described, as well as the topography, fauna and flora of the district. The numerous ticks and biting insects that occur include *Ixodes rasus*; *Hippobosca maculata*; *Glossina palpalis* and *G. fusca*; the Tabanids, *Tabanus latus*, *T. congolensis*, *Chrysops stigmaticalis* and *C. dimidiatus*; the Simuliid, *Simulium*

(*Eusimulium*) *damnosum*; and the Culicids, *Anopheles* (*Pyretophorus*) *costalis*, *Culex fatigans*, *Aëdes argenteus* (*Stegomyia calopus*) and *Mansonia uniformis*.

Hadwen (S.). **Effects following Improper Methods of Extracting** *Hypoderma* **Larvae from the Backs of Cattle.**—*Jl. Amer. Vet. Med. Assoc., Washington, D.C.*, lx, N.S., xiii, no. 6, March 1922, pp. 724–728.

The disease called "rose fever" in Denmark appears to be identical with hypodermal anaphylaxis, and the author quotes previous works on this subject [*cf. R.A.E.*, B, vi, 44; viii, 82, 83]. Squeezing out *Hypoderma* larvae from the backs of cattle lessens the number of warble-flies, and has had considerable success in Denmark; but to prevent unfavourable after-effects in the animals, the larvae must not be injured in the process, or removed hastily and roughly. The walls of the sac in which the larvae lie contain pus cells and bacteria in many cases, and may also hold toxic material excreted by the larvae. If these walls are lacerated, a variety of reactions may take place. The larvae may be removed by first softening the skin with water and then squeezing them out, or they may be extracted with forceps. The cavity should then be flushed with clean water, and where a larva has been accidentally ruptured the parts must be washed quickly to dilute and remove the toxic material. The author still favours the extraction of the larvae, but considers that further experiments should be undertaken before unskilled persons are permitted to do it.

Miller (D.). **The Cattle Tick and other Ticks in New Zealand.**—*N.Z. Jl. Agric., Wellington*, xxiv, no. 1, 20th January 1922, pp. 1–7, 5 figs., 1 map.

No tick-borne diseases occur among domestic animals in New Zealand. The species present in the Dominion are: *Haemaphysalis bispinosa*, Neum., *H. leachi*, And., *Hyalomma aegyptium*, L., *Ixodes ricinus*, L., on horses, *I. eudyptidis*, Mask., on penguins, *I. apteridis*, Mask., and *I. aptericola*, Mask., on kiwis, *I. anatis*, Chilton, on the grey duck (*Anas superciliosa*), *I. intermedius*, Neum., and a species infesting the tuatara lizard, which is to be described in the near future.

Haemaphysalis bispinosa is the only tick that is widely established in New Zealand. The eggs are laid on the ground in pastures, and the larvae are found on the ends of the leaves or on flower-heads of the grass. In the North Auckland Peninsula, where paspalum-seed is harvested, the larvae occur among the collected seed. It chiefly infests cattle, but is exceedingly common on hares and rabbits, and frequently attacks sheep, dogs and fowls. In some cases horses are heavily infested and occasionally man. *H. leachi* and *Hyalomma aegyptium* have only been recorded on some specimens of huia (*Neomorpha acutirostris*) skins collected 38 years ago and recently sent to Britain. It is suggested that they were brought from India to New Zealand on the minah (*Acridotheres tristis*), a bird that was introduced in 1875.

Judd (C. S.). **Bird Introductions.**—*Hawaiian Forester & Agric., Honolulu*, xviii, no. 11, November 1921, pp. 238–239. [Received 20th March 1922.]

The introduction of insectivorous birds for the control of the horn-fly [*Lyperosia irritans*] in Hawaii is discussed. The Chinese flycatcher

(*Trochalopteron canorum*) is already established on the islands, the other birds suggested for introduction being *Rhipidura tricolor*, occurring from Australia through the Malay islands to the mainland of Asia, and a meadow lark (*Sturnella neglecta*) from California.

FALLERONI (D.). **La Malaria di Trinitapoli.** [Malaria at Trinitapoli.] —*L'Igiene Moderna*, July–September 1921, 3 plates. (Abstract in *Ann. d'Igiene, Rome*, xxxi, no. 12, December 1921, pp. 794-795.) [Received 18th March 1922.]

The rival claims of Fermi and Rizzi [*R. A.E.*, B, vii, 6; viii, 192] in the matter of freeing the town of Trinitapoli from malaria are rejected, it being stated that the local authorities had already suppressed most of the breeding-places. Reclamation work, followed by the development of agriculture, with a consequent increase in the protection afforded by domestic animals, represents, in the author's opinion, the method to be pursued. The first observations on the protective rôle of domestic animals were, it is claimed, made by Buonservizi. Instead of attempting the capture of adult mosquitos, the use of insecticides against them is advised. The reduction of breeding-places on a small scale, *i.e.*, by covering cisterns, wells, etc., is considered preferable to oiling.

SCHWARZ (L.). **Mossul.** [Mosul.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic*, xxvi, no. 2, March 1922, pp. 38–43.

The sanitary conditions in Mosul in 1916–18 are described. There is a plague of flies in spring and autumn; in summer their numbers decrease, as the great heat restricts breeding-places, and in winter the low temperature prevents reproduction. Clothes lice [*Pediculus*] are the most important insect carriers of disease; they are particularly plentiful in early autumn, and do not disappear entirely in summer. Head lice are also common, but *Phthirus pubis* is almost absent. Both *Culex* spp. and *Anopheles* spp. occur. A species of *Stegomyia* is troublesome by day. Sandflies (*Phlebotomus*) are very troublesome. Fleas are numerous, but are unimportant as carriers of disease, as plague does not occur. Bed-bugs are rare.

McATEE (W. L.). *Prosimulium fulvum*, **Coquillett, a biting Species (Dip., Simuliidae).**—*Ent. News, Philadelphia, Pa.*, xxxiii, no. 3, March 1922, p. 79.

Prosimulium fulvum, Coq., ranges from Alaska to British Columbia, Montana and Colorado. It is stated by Twitchell to bite horses about the ears and sometimes around the eyes, and on one occasion to have attacked man.

McATEE (W. L.). **Bird Lice (Mallophaga) attaching themselves to Bird Flies (Dip., Hippoboscidae).**—*Ent. News, Philadelphia, Pa.*, xxxiii, no. 3, March 1922, p. 90.

Degeeriella rotundata, Osb., is recorded as attaching itself by the mandibles to the upper surface of the abdomen of the Hippoboscid, *Ornithomyia avicularia*, L. In one case the Hippoboscid was taken from a western crow (*Corvus brachyrhynchos hesperus*) in Ontario.

Similar records are reviewed.

Ewing (H. E.). **Studies on the Biology and Control of Chiggers.**—*U.S. Dept. Agric., Washington, D.C.*, Bull. 986, 3rd December 1921, 19 pp., 4 figs. [Received 22nd March 1922.]

After studying Riley's descriptions and figures of *Leptus americanus* and *L. irritans*, the author has come to the conclusion that the former is an Erythraeid and not a Trombidiid, and that *L. irritans* is the larva of a species of Trombidiid, but the characters given by Riley are not even of generic value, and it appears doubtful whether it will ever be known with certainty what species his *irritans* is. The author is also unable to correlate these species of Riley's with the two species that are familiar to him. One of these is found in New Jersey, Maryland, Columbia, Virginia and south-eastern Iowa, and the other is a closely related species in the northern and western United States, which has been studied by Howard [*R. A.E.*, A, vii, 327].

Notes are given on the seasonal history of these mites, their local distribution and habits, their hosts, the injury caused and their relation to disease. Though the only disease known to be transmitted by these Acarids is Japanese river fever, the author predicts that they will be found responsible for the carriage of others.

Man may protect himself from them by means of suitable clothing on the lower limbs, and by applying repellents, such as sulphur, either directly on the skin or on the undergarments, which should be of closely woven cloth and should fit tightly. Topped shoes or boots should be worn.

Infested fields may be rendered free by cultivation or cleaning away rough growth. Cattle or sheep are also valuable in destroying the mites. Wild blackberry or dewberry bushes often harbour them. On lawns they automatically disappear, and fields may be dusted with 50 lb. sulphur to every acre. Larvae on the body may be killed by applying acaricides, such as thick lathers of soap, any of the lighter oils, sulphur ointment or commercial alcohol—the latter should be applied freely, and the application repeated two or three times. Palliatives recommended are a saturated alcoholic solution of salicylic acid, with a little olive oil added, ammonia, cooking soda, dilute solution of iodine, camphor and alcohol.

Johnson (W. T.). **Exterminating Poultry Lice.**—*Bi-Mthly. Bull. Western Washington Expt. Sta., Puyallup, Wash.*, ix, no. 7, March 1922, pp. 114–117, 9 figs.

A description is given of dipping and dusting poultry in sodium fluoride for the extermination of lice [Mallophaga]. The dipping method consists of a lukewarm solution of $\frac{3}{4}$–1 oz. sodium fluoride to 1 U.S. gal. water ; this should not be applied in cold weather. The dusting method consists in applying a pinch of the drug on the skin and feathers of various parts of the body. One pound of the powder should be sufficient to treat 100 fowls, and one treatment is effective. Poultry will not remain permanently free, although if they are thoroughly treated reinfestation does not take place very quickly. Sodium fluoride does not destroy lice that are blood-suckers [Anoplura], and should not be used against lice on cattle and pigs. The solution should not be left in metal containers, as it corrodes them, and fowls should not be allowed to drink it.

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ROUBAUD (E.). **Les Mouches Tsétsés en Afrique Occidentale Française. Nos Connaissances actuelles sur leur Histoire et leur Rôle pathogène.**—*Bull. Comité Etudes Hist. & Scientif. Afr. Occ. Française, Paris*, no. 4, July–September 1920, pp. 257–300, 1 map, 7 figs. [Received 25th March 1922.]

The chief feature of this paper is a map showing the distribution of tsetse-flies and of the various forms of trypanosomiasis in French West Africa. This is the result of a survey and study undertaken during the years 1906–16 by MM. Bouet and Roubaud, during which some two-thirds of West Africa were traversed, while the works of other investigators have also been studied in the course of its preparation. It must be remembered that the whole system of economic life in that country is dependent upon the raising of cattle, and this is much affected by the presence of *Glossina*, a genus differing from any other biting fly in that it lives entirely upon blood and has no need of water, which it is said never to touch in nature. Cold-blooded animals, such as crocodiles, are only attacked in the absence of other food [see, however, *R.A.E.*, B, viii, 132]. The author states that, like Kleine, he has observed that flies that feed exclusively on crocodiles soon lose their fertility. For the reproductive functions to be normal, the females must feed on the blood of mammals or birds. As big game is considered to be the food preferred at all times by *Glossina*, the great game zones, where the human population is small, are indicated on the map, being important as reservoirs both of the fly and of the virus of trypanosomiasis.

A key is given to the species of *Glossina* occurring in French West Africa, viz. *G. tachinoides*, Westw., *G. palpalis*, R.-D., *G. morsitans*, Westw., *G. longipalpis*, Wied., *G. fusca*, Wlk., *G. nigrofusca*, Newst., *G. tabaniformis*, Westw., *G. medicorum*, Aust., and *G. pallicera*, Big. Of these, the first four are by far the most important and the most widespread, *G. morsitans* being essentially the big-game fly. The habitat and biology of these species are discussed. Seasonal migration of the flies and the influence of meteorological conditions on their extension are explained, as well as their relation to geographical and geological conditions. Their distribution is not absolutely based on conditions of vegetation or climate, and while *G. pallicera* and *G. fusca* are almost entirely limited to forest conditions, *G. tachinoides* and *G. longipalpis* may also be found in forest zones, though this is not their usual habitat, and *G. morsitans*, which is essentially a species of the plains, where the big game is found, may also occur in woodlands covered with thick brushwood, at short distances from water. *G. tachinoides* and *G. longipalpis* are essentially bush species, feeding on wild animals, but *G. palpalis* may frequently be found in close proximity to villages. The larger the number of flies, however, the less will be the danger to man, as numbers indicate a plentiful food supply, and cattle in this respect are certainly a protection to the inhabitants of such villages.

In the face of different climatic conditions, certain physiological reactions are found to occur among the species of *Glossina*, which are of great importance in that they influence their capacity for transmission of the various forms of trypanosomiasis. Investigation over a number of years has proved that the same species of *Glossina* is not capable of transmitting a given virus in every locality where it occurs. There are at least six forms of trypanosomiasis in French West Africa, four of which are specifically tsetse-borne, namely, sleeping sickness,

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produced in human beings by *T. gambiense* ; souma, a disease of horses and cattle caused by *T. cazalboui*; baleri, a disease of horses and dogs, caused by *T. pecaudi*; and a disease of horses, cattle and dogs, due to *T. dimorphon*. Human beings of any race seem to be equally susceptible to trypanosomiasis, but different races of animals show varying degrees of resistance. Pigs show a strong reaction against the disease, and the small native races of domestic animals, such as goats, horses and cattle, are far more resistant than the larger ones.

Although infection is confined to fly areas, trypanosomiasis is extremely localised in comparison with fly distribution, and may be severe in one district, but absent from another equally fly-infested. This, in the author's opinion, is due in a large measure to the biological variations produced by climatic conditions referred to above. Moreover, in only a small percentage of the flies that feed on infective hosts does the infective organism develop and become capable of infecting another host. Although the question is a complex one, it seems that there is no very great danger of a widespread extension of human trypanosomiasis outside the zones in which it actually occurs in French West Africa.

The destruction of *Glossina* by artificial means is not an easy problem, although in one instance a district that was highly infested, forming part of a large area thickly populated with *G. morsitans* beside the Gambia, has become clear of flies in consequence of clearing the land and driving off the big game. For hygrophilous species, living in wooded country beside water, partial clearing or thinning of the forest belts is the only efficient remedial measure. It is owing to the clearing operations on the banks of the Senegal and Niger that these rivers have ceased to be infested with *Glossina* throughout their length. Such clearing can be of much practical value if intelligently carried out at the most appropriate places, such as frequented water-courses, streams beside roads or native tracks, the outskirts of villages in forest zones close to water, etc. While these measures would entail a large amount of labour in the compact forest zone that covers a great portion of the coast in Guinea, the Ivory Coast, Togo and Dahomey, in the more northern fly-infested regions, such as the Sudan and Senegal, much might be done ; for example, at Nianing, on the Senegal coast, there is a small circumscribed area that is a well-known centre of sleeping sickness and various forms of animal trypanosomiasis. The disinfestation of this area is very desirable in every way, and does not present any serious difficulty. The permanent fly-breeding zones in particular should be attacked. It is suggested that much is to be gained by popularising information regarding the habits of *Glossina*.

SERGENT (Edm.). **Sur l'Hivernage des Moustiques des hautes Montagnes.**—*Bull. Soc. Hist. Nat. Afr. Nord, Algiers*, xiii, no. 2, February 1922, p. 36.

In view of observations made at an altitude of about 6,186 ft., near Chamonix, it is thought that mosquitos at high altitudes migrate to lower levels to hibernate. In the case under consideration, *Aëdes pullatus* var. *jugorum*, Vill., was noticed following the author's party for about two hours, descending about 3,000 ft.

La Plaga de la Garrapata en la República.—*Rev. Agric., Mexico*, vi, no. 11, March 1922, pp. 640–644, 5 figs.

The rôle played by ticks in the transmission of Texas fever is discussed ; the life-history of the tick [*Boophilus annulatus*] and the

process of dipping cattle to destroy the parasites are explained, and the construction of the necessary baths is described. The technique of preventive inoculation is also discussed, though this method has never proved entirely efficacious.

LUIGIONI (P.). **Una notevole Invasione di "*Symphoromyia grisea*, Meigen," a Fiuggi Fonte (Prov. di Roma). (Diptera—Fam. Rhagionidae.)** [A Noteworthy Outbreak of *S. grisea* at Fiuggi Fonte in the Province of Rome.]—Separate, 3 pp., from *Atti. Pontif. Accad. Nuovi Lincei, Rome,* lxxv, 18th December 1921.

Early in July 1920 a fly, *Symphoromyia grisea*, Meig., occurred in abundance at Fiuggi Fonte. The flies were very persistent in shady places, and their bites were painful. The ingestion of blood was ascertained experimentally, and according to Prof. Bezzi this is the first definite European record of blood-sucking in this genus.

Culex pipiens, L., *Theobaldia* (*Culex*) *annulata*, Schr., and *Anopheles maculipennis*, Meig. (*claviger*, F.), were noted in the same locality.

STRONG (W. M.). **Cases resembling Typhus Fever.**—*Med. Jl. Australia, Sydney,* 9th Year, i, no. 7, 18th February 1922, pp. 199–200.

Pediculoides ventricosus is suggested as a possible transmitter of cases of the infection closely resembling typhus fever noted previously [*R.A.E.*, B, x, 94].

CLARKE (J. T.). **The Etiology of Rheumatic Fever.**—*Brit. Med. Jl. London,* no. 3196, 1st April 1922, pp. 540–541.

It is suggested that rheumatic fever is probably caused by a protozoon, of which *Ceratophyllus fasciatus* (rat flea) is considered to be the carrier, man and rats being alternative hosts. Neither rheumatic fever nor *C. fasciatus* occur in the tropics. The geographical distribution of subinfective endocarditis, rheumatoid arthritis and of scarlet fever are similar to that of rheumatic fever, and their cause must be looked for on the same lines. They are possibly all caused by protozoa and possibly all carried by fleas.

HULL (J. E.). **The Harvest Bug.**—*Vasculum, Newcastle-upon-Tyne,* vi, no. 3–4, December 1920, pp. 73–76.

The systematic position of the harvest bug and the opinions of various authors on this subject are reviewed. The mite concerned has been described under various names, including *Leptus* (*Acarus, Microtrombidium*) *autumnalis*. Three species of harvest bug apparently occur in France, *L. autumnalis* being the commonest. In England *Allothrombium fuliginosum* seems to be the species concerned, as it is apparently the only one that is abundant in the areas infested with harvest bugs, the others being *Sericothrombium* sp. and *Ritteria nemorum*, both of which are known in the larval stages only. It is probably a characteristic of the genus *Allothrombium* that in the larval stage its members are blood-sucking parasites, but it is thought unlikely that they are capable of transmitting disease.

PEACOCK (A. D.). **A Recent Chapter in Medical Entomology.**—*Vasculum, Newcastle-upon-Tyne*, vii, no. 2, May 1921, pp. 65–73; viii, no. 1, October 1921, pp. 9–17, 3 figs.

An account is given of trench fever and the part played by *Pediculus humanus*, L., var. *corporis*, DeG., in its transmission [*cf. R.A.E.*, B, vi, 225, etc.].

MARSHALL (J. F.). **"Unofficial" Mosquito Control in England.**—*Sci. Progress, London*, xvi, no. 63, January 1922, pp. 462–468, 1 plate.

Culex pipiens, *Theobaldia annulata*, and *Aëdes* (*Ochlerotatus*) *detritus* are the commonest mosquitos on Hayling Island. An account is given of the methods adopted during 1921 to obtain the assistance of the general public in the control of these species.

KUNTZE (A.). **Bestimmungstabelle der Europäischen Culiciden (Stechmücken).** [Keys to the European Culicids.]—*Deutsche Ent. Zeitschr., Berlin*, 1920, no. 3–4, 1st February 1921, pp. 363–383, 3 plates.

These keys to the genera and species of the European Culicids are based chiefly on the works of Ficalbi and Theobald.

VAN LAAREN (G. F.). **Magelang geen Malaria-vrije Plaats.** [Magelang not a Malaria-free Locality.]—*Geneesk. Tijdschr. Ned.-Indië, Batavia*, lxii, no. 1, 1922, pp. 27–29.

Since 1901 several investigators have come to the conclusion that Magelang cannot be reckoned free from malaria, but, in spite of this, it is still used as a sanatorium for patients recovering from the disease.

Of 2,678 school children, 331 (about 13 per cent.) had enlarged spleens, and of these 61 were positive, 38 being cases of malignant tertian, 21 of benign tertian, and 2 of quartan malaria.

The following Anophelines occur: *Anopheles* (*Myzomyia*) *minimus* var. *aconitus*, *A. subpictus* (*rossi*), *A. indefinitus*, *A. schüffneri*, *A. fuliginosus*, *A. barbirostris*, and *A.* (*Cellia*) *kochi*. *A. minimus aconitus*, a known carrier, is a house-mosquito that is comparatively abundant and is found throughout the district.

KUIJER (A.). **Uit de Jaarverslagen van den Militair Geneeskundigen Dienst te Soemba 1919 en 1920.** [From the Annual Reports of the Military Medical Service at Soemba in 1919 and 1920.]—*Geneesk. Tijdschr. Ned.-Indië, Batavia*, lxii, no. 1, 1922, pp. 35–130.

On the island of Soemba malaria was met with everywhere in 1919 and 1920. Examination of 2,876 children yielded an average spleen-index of 51·8 per cent. *Anopheles vagus* (*Myzomyia rossi* var. *indefinitus*), and *A.* (*M.*) *barbirostris* occurred indoors. The former bred in both fresh and brackish water, and was the commonest species. *A.* (*M.*) *barbirostris* bred in a fresh water swamp, and *A.* (*M.*) *minimus* var. *aconitus* in a slow-flowing stream. In the rainy season a number of pools harboured larvae of *A. vagus*.

FRANCHINI (G.). **Au Sujet de la Culture de l'*Herpetomonas* du *Pyrrhocoris apterus*.**—*Bull. Soc. Path. Exot., Paris,* xv, no. 3, 8th March 1922, pp. 161–163.

The method of securing a pure culture of *Herpetomonas pyrrhocoris*, obtained from *Pyrrhocoris apterus* taken near Paris, and the forms of the flagellate are described.

FRANCHINI (G.). **Flagellose du Chou et des Punaises du Chou.**—*Bull. Soc. Path. Exot., Paris,* xv, no. 3, 8th March 1922, pp. 163–165.

Pentatomid bugs, found on cabbages near Bologna, included *Eurydema* (*Pentatoma*) *ornatum*, *E. ornatum* var. *pectorale*, *E.* (*P.*) *oleraceum*, and *Aelia acuminata*. With the exception of the last-named, all these species frequently harbour flagellates (*Crithidia*, and sometimes *Herpetomonas*) in their digestive tubes, and very occasionally also in the salivary glands and proboscis. The faeces of these insects contained many flagellates and leishmaniform bodies. The larval stages also were infected. The plants on which bugs were numerous showed yellow and dying leaves, and it was thought possible that the flagellates might penetrate into the tissues. Tests of affected leaves showed that this was probably the case, the parasites presumably penetrating the tissue of the plant by means of the puncture made by the insect or with the faeces.

M. Roubaud, commenting on this paper, remarked that he had previously found similar infections of cabbage bugs on two occasions. More than 90 per cent. of the bugs (*E. ornatum*) then examined were found to be parasitised, though no salivary infection was noticed. No flagellates could be found even in plants that were black with punctures of the bugs, and he therefore was of opinion that flagellosis of the cabbage does not actually occur, the wilting of the plants being due to the numerous punctures of the insects.

FRANÇA (C.). **Encore quelques Considerations sur la Flagellose des Euphorbes.**—*Bull. Soc. Path. Exot., Paris,* xv, no. 3, 8th March 1922, pp. 166–168.

Previous work on the discovery of flagellosis in *Euphorbia* is briefly reviewed. Patton, in a recent paper [*R.A.E.*, B, x, 72], has made the interesting discovery that in cases of kala-azar a small lesion is noticeable at the point of inoculation, as in flagellosis. Adie and Patton have pointed out that one phase of the cycle of *Leptomonas donovani* is, like that of *Trypanosoma lewisi*, intracellular, and it is thought that *L. davidi* may also have an intracellular phase in *Stenocephalus*. Research is being conducted on these lines, the author feeling convinced that the study of the evolution of *L. davidi* will contribute to the elucidation of the problem of kala-azar.

METALNIKOW (S.) & GASCHEN (H.). **Immunité cellulaire et humorale chez la Chenille.**—*Ann. Inst. Pasteur, Paris,* xxxvi, no. 3, March 1922, pp. 233–252, 1 plate.

In view of the great interest presented by the facts described by Paillot [*R.A.E.*, A, ix, 234] with regard to the immunity of invertebrates, similar experiments have been carried out by the authors, using *Galleria mellonella* infected with cholera vibrio.

It was found that *G. mellonella* may easily be infected by injecting an emulsion of the cholera vibrio, but infection is not produced by ingestion. The course of the disease produced depends on the virulence of the culture injected, the same results being obtained with dysentery bacilli of varying virulence. Immunity is easily acquired in from three to twenty-four hours, according to the virulence of the culture, the more virulent strains requiring the longer time. After immunity all cellular reactions become more marked and rapid, phagocytosis, the formation of giant cells, etc., all occurring more quickly. Immunity is the result of complicated involuntary reactions of various cells, these reactions being specific for each micro-organism.

LAKE (G. C.) & FRANCIS (E.). **Tularaemia Francis 1921, VII. Six Cases of Tularaemia occurring in Laboratory Workers.**—*Pub. Health Repts., Washington, D.C.*, xxxvii, no. 8, 24th February 1922, pp. 392–413.

The entire personnel of the laboratory that has been investigating tularaemia in rodents, caused by *Bacterium tularense*, under the United States Public Health Service, has become infected with a fever lasting about three weeks. The diagnosis in each of these cases rests upon the occurrence of a febrile period lasting about three weeks, positive serum reactions for agglutination and complement fixation to antigens composed of *B. tularense*, and the absence of febrile attacks in 100 other persons in the laboratory coming in casual contact with infected rodents. The skin of the hands must be considered as a possible means of entry of the infection in the laboratory workers, even in the absence of a local lesion or lymphadenitis.

Unrecognised cases of tularaemia probably occur in the known foci of infection in the United States, and routine serological tests would probably not only detect cases in known foci of infection, but would also reveal unknown foci. Light might also be thrown upon the etiology of some fevers of undetermined origin.

WELLS (R. W.), BISHOP (F. C.) & LAAKE (E. W.). U.S. Bur. Ent. **Derris as a promising Insecticide.**—*Jl. Econ. Ent., Geneva, N.Y.*, xv, no. 1, February 1922, pp. 90–95.

That derris promises to be of value both as a contact and a stomach poison has already been pointed out [*R.A.E.*, A, vii, 496]. In this paper, experiments are described in which powdered roots of *Deguelia* (*Derris*) *elliptica* were used against Mallophaga, including *Trichodectes scalaris* on cattle; Anoplura, including *Linognathus vituli*, L., and *Solenopotes capillatus*, End., on cattle, and *L. setosus*, Olf., on dogs; and the fleas, *Ctenocephalus canis*, Curtis, and *C. felis*, Bch., on dogs and cats, and *Echidnophaga gallinacea*, Westw., on dogs.

The minimum dose required per animal to kill all fleas on various breeds of dogs was found to be 0·87 gm. of a mixture of equal parts of derris and maize starch. One treatment proved to be sufficient to kill all stages of Anoplura on cattle and dogs; against Mallophaga on chickens and cattle it also proved very efficient, but not quite as effective on cattle as sodium fluoride. An ointment consisting of one part derris and two parts vaseline was applied to the apertures due to the presence of larvae of *Hypoderma lineatum* in the backs of cattle. Five days after application all larvae were killed, and the condition

of the cysts was very satisfactory. Practically all larvae were killed by a wash consisting of 1 lb. derris, 4 oz. soap, and 1 U.S. gal. water applied with a brush to the backs of the infested cattle.

Wallace (F. N.) & others. **Report of the Division of Entomology.**—*3rd Ann. Rept. Indiana Dept. Conservation, 1920–21, Indianapolis,* 1922, pp. 37–57. [Received 10th April 1922.]

Remedial measures for houses infested with fleas include mopping the floors with a 5 per cent. solution of a cresol preparation. Basements should be sprayed with cresol solution, and a vacuum cleaner run over all the floors, as this picks up eggs, larvae and adults. If the house can be closed for 24 hours, naphthaline flakes, at the rate of 5 lb. to a room, should be scattered over the floors. Dogs may be washed in a 3 per cent. solution (4 tablespoonfuls to 1 U.S. gal. water) of cresol. Cats should be dusted with pyrethrum powder.

The most practical remedy for bed-bugs is gasoline. Seams and buttons on mattresses should be carefully treated, and all cracks and crevices of the bedstead flooded. Cracks in the floor, etc. should be flooded with gasoline at intervals of a week, and after two or three weeks this should give complete control.

Cooley (R. A.). **Fourth Biennial Report of the Montana State Board of Entomology, 1919–20.**—*Helena,* January 1921, pp. 1–17. [Received 11th April 1922.]

During 1919 and 1920 efforts have been devoted almost exclusively to the control of *Dermacentor venustus,* Banks (spotted fever tick) in Western Montana. The procedure now in force is the destruction of the ground squirrel, which harbours the immature stages of the tick, and the prevention of adult ticks from feeding on domestic animals. Tables are given showing the prevalence of spotted fever in Montana.

Further investigations are now needed to ascertain the origin in nature or ultimate source of this disease. Under laboratory conditions, besides the guinea-pig and the Belgian hare, other animals susceptible to the disease are *Citellus columbianus* (ground squirrel), *Callospermophilus lateralis cinerascens* (rock or side-striped squirrel), *Eutamias luteiventris* (chipmunk), *Neotoma cinerea* (mountain or wood rat), *Putorius arizonensis* (weasel), *Lepus bairdi* (snowshoe rabbit), *Sylvilagus nuttalli* (cottontail rabbit), and the prairie dog of Eastern Montana. It is of the utmost importance to ascertain the responsibility of these and other mammals as reservoirs of the disease.

Reference is made to the discovery of the causal agent of this disease, *Dermacentroxenus rickettsi,* Wolbach [*R.A.E.*, B, x, 27].

Parker (R. R.). **Report of Tick Control Operations in the Bitter Root Valley during the Seasons of 1919 and 1920.**—*4th Bienn. Rept. Montana State Bd. Ent., 1919–20, Helena,* January 1921, pp. 18-44. [Received 11th April 1922.]

The control of *Dermacentor venustus* (Rocky Mountain spotted fever tick) is difficult owing to the complicated life-cycle and host-relationship of the tick, as well as the climatic and economic conditions in which it occurs. From 2,000–7,000 eggs are deposited by each female under rocks and litter during the spring and early summer. The larvae feed only on the blood of rodents from one to several days; they then drop off and pass the remainder of that year and the following winter resting, appearing as nymphs the next spring.

The latter, which are also confined to rodents, repeat the history of the larvae, only feeding for a day or so longer, and become adults in the next spring, approximately two years after the eggs were deposited. The minimum period of engorgement in the adults, which feed on larger animals, is ten days, and those not securing hosts may live two to four years. The salient features from the standpoint of possible control are that the ticks feed only on the blood of mammals, and that a new host is required by each of the three stages, which only feed for a few days in three successive seasons, and are only active at certain times during the season.

There are two methods of attack—eliminating the hosts so that the ticks will starve, or killing the ticks on the hosts. The immature stages can only be attacked by the former method, and the ground squirrel is directly responsible for 95 per cent. of the ticks. An account is given of the various methods of controlling adult ticks on animals; these have already been noticed [*R. A.E.*, B, ix, 111]. The application of kerosene and lard, and turpentine and lard, has served to free animals of ticks for long periods. Raw cottonseed and raw linseed oil also show considerable promise. On cattle the oil should be applied from the base of the horns to a point about halfway between the hips and thighs, and about 4 or 5 fluid oz. to each animal.

The author deals at length with the need for new investigations. The chief fact underlying the proposed research is that, given equivalent adult host conditions, the abundance of ticks in any locality is dependent on the character of the vegetation or of the soil covering, as this determines the species of rodents and their relative abundance. The great value of such investigations would be that they might show that the reservoir of the disease may be controlled and the prolonged programme of tick control done away with.

SCHOPPE (W. F.). **Control of Poultry Lice and Mites.**—*Montana Agric. Expt. Sta., Bozeman,* Circ. 95, May 1921, 8 pp., 2 figs. [Received 12th April 1922.]

This circular is a revision of an earlier one [*R. A.E.*, B, vi, 65], and has been amplified by information from other papers that have already been noticed.

STURTEVANT (A. H.). **The North American Species of** *Drosophila.*—*Carnegie Inst. of Washington, Washington, D.C.,* Pubn. 301, 1921, 150 pp., 3 plates, 49 figs. [Received 29th May 1922.]

This systematic study of the genus *Drosophila*, as occurring in North America, has been made largely because the flies of this group have been found very suitable for laboratory experiments, and also because there has been a large number of mutations discovered in the laboratory races of *D. melanogaster*, Meig., and it was hoped that fertile hybrids might be obtained for the purpose of comparison with wild species of *Drosophila*. This attempt has not as yet been successful.

The more important available information concerning the DROSOPHILINAE is brought together in this useful monograph, and, though dealing essentially with North American species, the exotic forms are incidentally dealt with. The taxonomy, anatomy, development, distribution and habits of the group are presented as fully as possible; only a brief survey of experimental work is attempted, but a bibliography of the experimental literature is given, as well as a catalogue of the described species.

Bat-bugs and Bed-bugs.—*Jl. Dept. Agric. Union S. Africa, Pretoria,* iv, no. 3, March 1922, p. 209.

The question has recently been raised whether the bug found associated with bats is distinct from the one infesting human habitations. *Cimex lectularius* (bed-bug) specialises on man, and has become adapted to his habits ; *C. pilosellus*, characterised by longer hairs and antennal differences, specialises on bats. *C. rotundatus* is the common bed-bug in some tropical countries, as in parts of India, and is recorded as a poultry pest also. It is stated to occur in Africa. Animal parasites generally confine themselves to a particular host, and are unable to exist for long on any other animal, although they may occasionally bite others. *C. lectularius* has been fed experimentally on mice, and has even transmitted disease in that manner, but there is no evidence that the mouse is anywhere its normal host. It is probable that the bug commonly associated with bats will bite man occasionally, but it is unlikely that it could subsist as a human parasite. The common bed-bug does not shelter in human hair ; it is therefore unlikely to hide in bat fur, and in any case would probably drop off when the bat took wing.

Newstead (R.). **A new Species of *Phlebotomus* from Trinidad.**—*Ann. Trop. Med. & Parasit., Liverpool,* xvi, no. 1, 31st March 1922, pp. 47–50, 1 fig.

Phlebotomus trinidadensis, sp. n., is described from Trinidad, this being the first authentic record of the occurrence of this genus from the West Indies.

Newstead (R.) & Evans (A. M.). **A new Tsetse-fly from the South Cameroons.**—*Ann. Trop. Med. & Parasit., Liverpool,* xvi, no. 1, 31st March 1922, pp. 51–54, 2 figs.

Glossina haningtoni, sp. n., is described from South Kamerun, occurring only in the neighbourhood of Basho. *G. palpalis*, R.-D., and *G. pallicera*, Big., were taken in the same locality, the latter being apparently the commonest species.

Waterston (J.). **A Contribution to the Knowledge of Sandflies.**—*Ann. Trop. Med. & Parasit., Liverpool,* xvi, no. 1, 31st March 1922, pp. 69–92, 1 plate, 7 figs.

The investigations here described were carried out in Macedonia on three species of sand-flies, *Phlebotomus papatasii*, Scop., *P. minutus*, Rond., and *P. perniciosus*, Newst. In the summer of 1918 there was a severe outbreak of sand-fly fever in and around Janes ; *P. papatasii* was by far the most abundant species and is thought to be the most likely vector of the disease. This point can, however, only be settled by direct experiment. The bionomics of the flies are described. In studying their habits great difficulty was experienced in keeping them alive until suitable apparatus for handling them was improvised. The appliances used are described and illustrated. Details are also given of the technique employed.

Apparently mating takes place after the females have had a blood feed, the process of which is described. No males were found to bite. A full feed on an empty stomach occupies from four to four and a half minutes ; the whole gut may be cleared in five days, but sometimes

takes longer. A considerable amount of moisture is evidently required to induce oviposition in captivity. Owing to the occurrence of fungi, accurate counts of the eggs could not be made, but so far as it was possible to judge, the largest number was laid in plain earth or earth and lizard faeces. At least nine days were required for the eggs to hatch. Excess of moisture for a limited time has no effect on the viability of the eggs; they hatched after being immersed for a day, but drying even for a short time is fatal. Larvae of the first instar can also survive excess of moisture for some time, but are extremely sensitive to thorough drying and shrivel if exposed for a few hours in the shade. They begin to feed as soon as the head has darkened, *i.e.* the mandibles hardened, and select when feeding on lizard faeces the chitinous fragments mixed with partly digested fibre. They will also feed on the dead bodies of the parent flies and on the younger larvae.

Finely ground mixed blood and earth proved a satisfactory food substitute. The first eggs hatched on the 20th September. The slow growth of the larvae from the late September eggs suggests that in Macedonia there may be one brood less than in India, and that the wintering brood begins at least a month earlier. That the September brood hibernates has been subsequently confirmed. Once the critical stages of hatching and the first instar have been passed the larvae apparently possess unexpected powers of resisting dessication, which must be of considerable help to the species in its natural breeding haunts, where the conditions as regards moisture are variable.

Of the various preventive measures discussed nets have proved successful, but all bedding should be thoroughly shaken or beaten before the net is adjusted for the night. Ordinary paraffin, if liberally applied, will keep the flies off. Suggestions for the treatment of tents and marquees include the levelling of the floor and the filling in of all cracks with a mixture of cresol and sand or sawdust. The floor should be liberally watered with a strong solution of cresol, and, if possible, covered with a ground sheet. According to the severity of the plague the tent should be periodically closed and sprayed with a solution of formalin or fumigated with cresol. A one per cent. formalin solution has been recommended, but the author considers this too weak. In corrugated iron huts formalin may be replaced by a one per cent. mixture of cresol in paraffin emulsion. All cracks round a tent for a distance of two feet from it should be filled in and the soil sprinkled with cresol. A warning is given against various camp practices likely to further the breeding of the species. Suspected breeding-sites should be sprinkled with cresol 10 to 14 days after the disappearance of the successive waves of sand-flies that occur from June to September.

Blacklock (B.) & Adler (S.). **A Parasite resembling** *Plasmodium falciparum* **in a Chimpanzee.**—*Ann. Trop. Med. & Parasit., Liverpool,* xvi, no. 1, 31st March 1922, pp. 99–106, 1 plate.

A blood parasite morphologically indistinguishable from *Plasmodium praecox* (*falciparum*) has been isolated from a chimpanzee at Freetown, Sierra Leone. Attempts to infect *Anopheles costalis* by allowing individuals bred in the laboratory to feed on the animal on two successive nights failed. Experiments with injections, either subcutaneous or intravenous, of infected blood into man also proved negative.

So far these experiments do not confirm Reichenow's conclusion that the chimpanzee may be a reservoir of *P. praecox*, and therefore a source of danger to Europeans in West Africa [*R.A.E.*, B, ix, 129].

Mason (F. E.). **Egyptian Fever in Cattle and Buffaloes.**—*Jl. Comp. Path & Therap., London*, xxxv, pt. 1, March 1922, pp. 33–39.

Further observations on Egyptian fever are recorded, as it has been alleged that the country is infected with East Coast fever, which the author has not found in Egyptian cattle, but only in Sudanese cattle arriving in quarantine.

The course of the former disease and its symptoms are described. It is probable that a high percentage of cattle become infected during the first few months of their lives. The ticks commonly found in association with the disease are *Boophilus* (*Margaropus*) *annulatus* and *Hyalomma aegyptium*. Since 1915 spraying with freshly prepared arsenical dip and disinfection of sheds or removal to fresh land have been carried out each year. The use of trypanblue or arrhenal has no effect on the parasite. The disease is caused by a *Theileria* and not a *Piroplasma*, and it would appear not to be transmissible by blood innoculation. The disease is not limited to Egypt, and a brief account of it in other countries is given.

Two cases of Egyptian fever in buffalos are recorded. Piroplasmosis of buffalos in Egypt appears to be of little economic importance, but care should be taken that possible carriers are recognised.

Hearle (E.). **Mosquito Control Investigations in British Columbia.**—*Scientific Agric. Gardenvale, Quebec*, i, no. 2, February 1921, pp. 68–70, 4 figs. [Received 12th April 1922.]

The Fraser Valley in British Columbia is periodically subjected to severe infestation of mosquitos. Over 20 species of mosquitos occur, the two important ones being *Aëdes aldrichi*, Dyar, and *A. vexans*, Meig. Both species breed in the low areas bordering the Fraser River, whenever these are flooded. In the case of *A. aldrichi* the winter is passed in the egg-stage in the alder-bottom areas bordering the river. The adults are capable of spreading 15 miles from their breeding-places. They are extremely troublesome all through the day in sheltered places. *A. vexans* breeds in open meadows and prairies near the river which are flooded at high water time. The winter is passed in the egg-stage, and the number of eggs is considerable, the adults usually emerging two weeks after hatching. The adult life is about six weeks.

It is thought that the problem may be overcome if a determined attempt is made by the residents of infested territory. The reclamation of larger breeding areas by dyking and pumping is the first step necessary. An aerial survey is being planned to facilitate the marking of the main breeding areas.

Dry (F. W.). **Annual Report of the Division of Entomology, Kabete, for the Year ending 31st March 1920.**—*Kenya Dept. Agric. Ann. Rept., 1919–20, Nairobi*, 1921, pp. 71–77. [Received 13th April 1922.]

The species of *Glossina* recorded are *G. fusca*, Wlk., *G. palpalis*, R.D., *G. austeni*, Newst., *G. brevipalpis*, Newst., *G. longipennis*, Cort., and *G. pallidipes*, Aust. The highest elevation from which any species is recorded is 5,200 feet, and as most of the Trans-Nzoia is above this elevation it must be expected to be more or less fly free. Certain cases of trypanosomiasis recorded probably originated outside this area.

A short account is given of a study of the blood-sucking flies of a district near Kericho [*R.A.E.*, B, x, 16].

Eckstein (F.). **Beiträge zur Kenntnis der Stechmückenparasiten.** [Contributions to the Knowledge of Parasites of Mosquitos.]—*Centralbl. Bakt. Paras. Infekt., Jena*, Ite. Abt. Orig., lxxxviii, no. 2, 13th April 1922, pp. 128–135, 4 figs., 1 plate.

The author has found the cercaria of *Distomum* sp. in the larvae of *Anopheles maculipennis*, and what were probably gregarines in *Aëdes cinereus* and *A.* (*Culicada*) *vexans*. A Nematode occurred in *Culex pipiens*, but not in *A. maculipennis*, *A. bifurcatus*, or *Culex hortensis* (*territans*) living in the same pool. A Trematode was, however, found in all four species.

Fülleborn (—). **Ueber „ *Cercaria armata* " und Mückenlarven.** [*C. armata* and Mosquito Larvae.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic*, xxvi, no. 3, March 1922, pp. 78–81, 3 figs.

As a result of aquarium experiments with *Culex pipiens* and *Theobaldia annulata*, it would appear that *Cercaria armata* is a valuable auxiliary in combating mosquito larvae, and an experiment under natural conditions is suggested.

Martini (—). **Ueber den Einfluss der Wasserzusammensetzung auf die Kiemenlänge bei den Mückenlarven.** [The Influence of the Composition of Water on the Length of the Gills in Mosquito Larvae.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic*, xxvi, no. 3, March 1922, p. 82.

Experiments show that larvae bred in salt solutions have short gills, and those bred in dilute acid have long ones. The extremes were 0·6 in sea water from the Baltic and 2·4 in phosphoric acid, taking the figure for fresh water as 1. The length of the gills cannot be used as a differential character except with the utmost caution. It is useless in differentiating *Aëdes punctor* and *A. nigripes*, as done by Wesenberg-Lund, and *A. caspius* and *A. dorsalis* by Edwards.

Dutt (B. N.). **Indian Cantharides.**—*Indian Med. Gaz., Calcutta*, lvii, no. 3, March 1922, pp. 92–93.

In the drug trade, four kinds of cantharides are used, obtained from *Lytta* (*Cantharis*) *vesicatoria*, L. (the European beetle, generally imported from Spain), *Mylabris sidae*, F., and *M. phalerata*, Pallas (chiefly Chinese), and *M. chicorii*, F. Blister beetles are found in nearly all the Provinces of India, but chiefly in Gwalior, which supplies the requirements of all the Government Medical Stores Depôts. The beetles appear in the fields in July, and can be collected on cloths spread below the plants. They should be shaken off the plants before sunrise, when they are unable to fly, otherwise the collectors are liable to be attacked.

Indian cantharides is a more powerful vesicant than European; while the Spanish beetle yields on an average 0·7 per cent. of cantharidin, in Indian beetles the percentage varies from 0·7 to 1·92. *Cantharis hirticornis*, from the Murree Hills and Hazara, contains as much as 2·02 per cent. The Indian product ought to fetch higher prices than the others, but at present there are not sufficient supplies even for the home demand. With the spread of knowledge, large quantities of these beetles will no doubt be collected in the N.W. Frontier Provinces for exportation; at present they are being wasted for lack of enterprise.

KEATES (H. C.). **Note on a Case of Typhus-like Fever occurring at Murree.**—*Indian Med. Gaz., Calcutta*, lvii, no. 3, March 1922, pp. 101–102.

The author records another case of a typhus-like fever in India, possibly transmitted by ticks [*cf. R.A.E.*, B, ix, 214]. The clinical aspect of the case is described. All necessary steps were taken to disinfect the house and isolate contacts, and although there were four other inhabitants in the house, no other case occurred. The roof of the house was infested with flying squirrels. These were all cleared away when the house was disinfected. Whether they were a source of infection is not known, but it is perhaps significant that Rocky Mountain fever is caused by an organism infesting squirrels and transmitted by ticks. In the light of the article referred to above, it seems probable that the case was one of Rocky Mountain fever rather than typhus as was at first supposed.

WILLIAMS (C.). **Notes on the Chemical Control of Cattle Dipping Tanks.**—*S. African Jl. Sci., Johannesburg*, xviii, nos. 1–2, December 1921, pp. 147–153. [Received 19th April 1922.]

In a previous paper [*R.A.E.*, B, iii, 219] the author emphasised the need for a periodical chemical analysis of arsenical dip fluids from cattle-dipping tanks, but cases have come to his notice in which the amount of oxidised arsenic in the tank is too serious to be ignored. The results of periodical analyses of fluids taken from both tanks on the Cedara Experiment Farm during the past two years are given.

In estimating the arsenic in ordinary dip fluids by titration with standard iodine solution, the error due to absorption of the iodine by the organic matter in the dip fluid is negligible if the fluid is first clarified by the aid of a few cubic centimetres of either strong hydrochloric or sulphuric acid. It has been stated that frequent addition of fresh excretory matter to the dipping tank retards the oxidising action and causes speedy reduction of the oxidised arsenic.

Experience has shown that some tanks, although fulfilling these conditions, still show a serious weakening of strength by oxidation. It is therefore essential that farmers should forward samples periodically to a laboratory for proper chemical analysis as a check on tests carried out by themselves.

Standard solutions of iodine supplied by certain dealers to farmers for testing their fluid dips appear to keep their strength for three to four months, but afterwards deteriorate fairly rapidly. Water containing an appreciable amount of saline matter, especially salts of iron and of the alkaline earths, when used in making up a dip fluid, may cause serious precipitation of both the oxidised and the unoxidised arsenic in the dipping tank. Salts of sodium and potassium in the water would have no such deleterious effect.

HIRST (S.). **Mites injurious to Domestic Animals. (With an Appendix on the Acarine Disease of Hive Bees.)**—*Brit. Mus. Nat. Hist., London*, Econ. Ser. no. 13, 1922, 107 pp., 85 figs. Price 3*s*.

A full and detailed account is given of the Arachnids or mites that are injurious to domestic animals, and the forms of mange to which they give rise.

The connection between the Tarsonemids, *Acarapis woodi*, Rennie, and *Tarsonemus apis*, Rennie, and the Isle of Wight disease of bees is discussed [*R.A.E.*, A, ix, 338].

Carter (H. R.). **Yellow Fever in Peru. Epidemic of 1919 and 1920.**—*Amer. Jl. Trop. Med., Baltimore*, ii, no. 2, March 1922, pp. 87–106, 1 map.

The elimination of yellow fever from Guayaquil was planned in 1916, but postponed on account of the war, with the result that by the beginning of 1919 this disease had been introduced into Northern Peru and spread rapidly.

In the control of the epidemic efforts were made to destroy the breeding-places of *Stegomyia* [*Aëdes argenteus*, Poir.], isolate the sick, and fumigate infected premises. The chief object was to prevent the further extension of infection. The breeding-places consisted largely of the water containers in houses, which were rarely emptied entirely before refilling, owing to the scarcity of water. This made control difficult, but eventually the Government arranged for the free distribution of water with good results. It was urged that these same measures should be extended to healthy places in the south exposed to infection, but unfortunately this was not carried out efficiently.

Yellow fever was eliminated from the northern department, where this campaign was undertaken, the last doubtful cases occurring in September 1920, but had been found in epidemic form in January well to the south, where it had existed for some months. The campaign for 1921 is outlined, and if at the end of the year the disease is eliminated from that district, Peru and the whole Pacific coast of South America should be permanently free from it.

Bass (C. C.). **Studies on Inoculation of Experimental Animals with Malaria.**—*Amer. Jl. Trop. Med., Baltimore*, ii, no. 2, March 1922, pp. 107–114, 1 table.

The experiments in inoculation with blood containing *Plasmodium praecox* (*falciparum*) here described furnish additional evidence that guinea-pigs, rabbits, and monkeys (*Macaccus rhesus*) are resistant to human malaria, and tend to support the conclusion of other workers, that they are not susceptible to infection.

Dyar (H. G.). **The American** *Aëdes* **of the** *scapularis* **Group (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, x, no. 4–6, April–June 1922, pp. 51–60.

This group has no representatives in Europe. A key is given to the adults of the seven species dealt with. The subspecies include *Aëdes tortilis virginensis*, n., from St. Thomas, Virgin Islands.

Dyar (H. G.). **Two Mosquitoes new to the Mountains of California.**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, x, no. 4–6, April–June 1922, pp. 60–61.

The two additions to the fauna of the Californian mountains are *Culex territans*, Wlk., bred from a grassy pool containing large numbers of *Aëdes cataphylla*, Dyar, and a few *A. palustris*, Dyar, and *A. impiger*, Wlk., occurring in the same breeding-places as *A. cataphylla*.

Dyar (H. G.). **Illustrations of the Male Hypopygium of certain Sabethids (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, x, no. 4–6, April–June, 1922, pp. 61–62, 1 plate.

The species dealt with are *Sabethinus undosus*, Coq., *S. aurescens*, Theo. (*identicus*, D. & K.), *Sabethes cyaneus*, F., and *S. bipartipes*, D. & K.

PAWAN (J. L.). **The Oviposition of** *Joblotia digitatus* **Rondani (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, x, no. 4–6 April–June 1922, pp. 63–65, 1 plate.

In Trinidad *Joblotia digitata*, Rond., generally oviposits in the rain-water accumulated in the broken cacao pods in shady parts of the cacao field. The eggs float on the surface of the water in masses of 25–40, and hatch in 8–10 hours after oviposition. The process of oviposition is described.

DYAR (H. G.). **The Mosquitoes of the Palaearctic and Nearctic Regions (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, x, no. 4–6, April–June 1922, pp. 65–75.

The exact degree of difference constituting a species and a geographical race or variety is more or less a matter of individual opinion. In some details the author considers it necessary to dissent from Edwards' conclusions [*R.A.E.*, B, x, 17]. He disapproves of the European form of *Aëdes pullatus*, Coq., being called var. *jugorum*, Vill., as the characters cited appear to be without special value. *A. intrudens*, Dyar, is considered to be easily separated from *A. pullatus* or *A. communis*, DeG. If *A. sticticus*, Meig., is to replace any American name, it will be *hirsuteron*, Theo., of which *aestivalis*, Dyar, is probably a synonym ; it is not a synonym of *aldrichi*, D & K., as Edwards thought possible. With regard to *A. punctor*, Kirby, it is thought that the European form should be called *A. meigenanus*, Dyar, and that *A. punctor* is its American representative. *A. lazarensis*, F. & Y., is considered by Edwards to be a synonym of *A. communis*, DeG., and *A. tahoensis*, Dyar, and *A. pionips*, Dyar, as possible synonyms ; the first two are, however, thought to be races, and should stand as *A. communis lazarensis* and *A. communis tahoensis*, while *A. pionips* is a distinct species. *A. lesnei*, Séguy, is the same as either *A. semicantans*, Mart., or *A. freyi*, Edw., and not a synonym of the black-legged *A. sticticus*, Meig., as doubtfully referred by Edwards. The species which Edwards calls *A. excrucians*, Wlk. (*surcoufi*, Theo. ?), differs from the American *excrucians* in the larval characters, and therefore if the identity of *surcoufi* cannot be ascertained a new name will be required. With reference to Edwards' *A. alpinus*, L. (*innuitus*, D. & K., and *nearcticus*, D.), and *A. parvulus*, Edw., the author considers the synonymy should be *A. alpinus*, L. (*innuitus*, D. & K.), and *A. nearcticus*, D. (*parvulus*, Edw.).

DYAR (H. G.). **The Mosquitoes of the Glacier National Park, Montana (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, x, no. 4–6, April–June 1922, pp. 80–88.

This list of the mosquitos found in the mountains of Montana forms a supplement to a previous one, in which the species occurring in the plains were dealt with [*R.A.E.*, B, vi, 8].

DYAR (H. G.). **Mosquito Notes (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, x, no. 4–6, April–June 1922, pp. 92–99.

The species dealt with include *Aëdes iridipennis*, sp. n., a female of which is described from Arizona at an altitude of 6,100 feet ; *A. terrens homoeopus*, subsp. n., from Costa Rica and Mexico ; *Culex*

(*Choeroporpa*) *pose*, D. & K., the male of which is described from Louisiana ; *C.* (*Isostomyia*) *bifoliata*, sp. n., males of which were bred from larvae found in a hole in a plum tree in Panama ; *Wyeomyia modalma*, sp. n., from Panama ; *W.* (*Shropshirea*) *ypsipola*, sp. n., bred from larvae found in a tree hole at Comacho ; and *Goeldia paranensis*, Brèthes, of which further material has now been examined [*R.A.E.*, B, x, 96].

PADWICK (H. B.). **Some Notes on Early Attempts at Prophylaxis against "Coast Fevers" on the West Africa Station.**—*Jl. R.N. Med. Service, London*, viii, no. 2, April 1922, pp. 89–98, 4 diagrams.

The author records from some journals found in his ship notes on the difficulties experienced by former medical officers on the West African station in dealing with mosquito-borne diseases from about the middle of the last century.

An efficient mosquito net for use with hammocks on ships is described and illustrated. Owing to the proper use of this net the malaria on the author's ship has been reduced from 89 and 42 cases during two recent commissions to four cases only.

Tsetse Fly Studies.—*Jl. Dept. Agric. Union S. Africa, Pretoria*, iv, no. 4, April 1922, pp. 303–304.

Extracts are given from a report of Mr. R. H. Harris on *Glossina pallidipes* in Zululand. The twelve breeding-places discovered are all closely associated with small pans or drinking-places, with a low-growing, unidentified bush, and with shady places where game stand after drinking. The soil was dry, sandy loam, rich in humus. No pupae were found under logs or in tree-trunks or between forked roots, such as *G. morsitans* prefers. Major forest shade is not essential to *G. pallidipes*. In all these breeding-places the water in the adjacent pan had dried up and only empty puparia were found, except in one place where a large puparium that resembled that of *G. brevipalpis* was discovered. It is thought that the game, which come regularly to water, are the source of food supply to a certain number of females.

It is considered that were it possible to burn vast tracts of country simultaneously the numbers of the fly would be reduced, as it is unable to travel in the great heat of the sun. It has already been demonstrated that the males cannot live longer than three days without food, and the females die very readily in the heat. The burning experiment would have to be continued over several years. It is also considered that the game will have to be reduced to a point when it ceases to provide food for large numbers of flies, and attention can then be concentrated on the limited breeding-places of the fly that would result.

MARTINI (E.). **Ueber ein gutes Unterscheidungsmerkmal von** *A. plumbeus* **und** *A. bifurcatus*. [On a good differentiating Character between *A. plumbeus* and *A. bifurcatus*.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic*, xxv, no. 12, December 1921, pp. 364–365.

Owing to a misunderstanding of the formula used, a mistake was made in a recent notice of this paper [*R.A.E.*, B, x, 76]. The essential character differentiating the palpal joints in the females of *Anopheles bifurcatus* and *A. plumbeus* is that in the former the fifth joint is less than half as long as the fourth, whereas in *A. plumbeus* it is more than half as long.

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Walden (B. H.). **Abundance of the German Roach in a City Dump.** *Blatella germanica*, **Linn.**—*Conn. Agric. Expt. Sta., New Haven*, Bull. 234, 1922, pp. 188–189.

Blatella germanica, L., was very abundant in a dump in a park in New Haven, and caused much trouble by migrating to neighbouring houses. *Periplaneta americana*, L., and *Gryllus domesticus*, L., were also present. The numbers were greatly reduced by spraying with kerosene and by burning as much of the rubbish as possible.

Mason (F. E.). **Veterinary Pathological Laboratories.**—*Ann. Rept. Vet. Service, 1920–21, Minist. Agric., Egypt, Cairo*, 1922, pp. 23–40.

The occurrence of Egyptian fever in buffalos is recorded [*R.A.E.*, B, x, 127]. The ticks that have commonly been found in association with the disease are *Boophilus* (*Margaropus*) *annulatus*, *B.* [*annulatus*] *australis*, and *Hyalomma aegyptium*. From the nature of the disease it is evident that it is caused by a *Theileria* (probably *T. annulata*) and not by a *Piroplasma*, and there is evidence that it is not transmissible by blood inoculation. The indications are that the blood parasites must pass through the sexual stage in the body of a tick before becoming infective. The disease is by no means peculiar, or limited to Egypt, and in view of its distribution and identity with "Transcaucasian fever," it is suggested that a more geographically suitable name than either of these should be found.

During an attack of *Aphis leguminosa* on forage crops, it was found that farm animals, particularly donkeys, and to a less extent horses, suffered from the presence of this Aphid. The animals lost a good deal of their hair, exhibited symptoms of inflammation and swelling, and when fed on infested clover in stables developed inflammation of the mouth. This complaint is said to be peculiar to Upper Egypt, and is common during the clover season, especially on land where the crop is not watered.

Johnston (T. H.). **Onchocerciasis of Queensland Cattle.**—*Trans. & Proc. R. Soc. S. Australia, Adelaide*, xlv, 21st December 1921, pp. 231–247, 28 figs., 1 table. [Received 29th April 1922.]

The three species of *Onchocerca* recorded as parasites of the connective tissues of Queensland cattle are *Onchocerca gutturosa*, Neum. (recorded in a previous paper as *O. bovis*, Piettre [*R. A.E.*, B, viii, 174]), which is probably widely distributed in Queensland, and occurs not uncommonly in cattle slaughtered in Sydney; *O. lienalis*, Stiles, which is extremely common in cattle, especially in dairying districts on the south-east; and *O. gibsoni*, Cleland & Johnston, which occurs in cattle in Queensland, New South Wales, and the Northern Territory.

A description of both sexes of these species is given, and reference is also made to *O. fasciata*, Railliet & Henry, which infests camels in Western Australia.

Johnston (T. H.) & Tiegs (O. W.). **What Part can Chalcid Wasps play in controlling Australian Sheep-maggot Flies?**—*Queensland Agric. Jl., Brisbane*, xvii, pt. 3, March 1922, pp. 128–131.

This paper has been published to give wider publicity to views expressed by these authors on previous occasions [*R. A.E.*, B, ix, 155; x, 1] on the economic importance of Chalcids in the control of sheep-maggot flies, and to add some further observations.

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The extent to which a parasitic insect can control its host depends on various factors. The most important is the readiness with which the parasite can gain access to the host, its usefulness depending on the ratio of hosts available for attack to those which are inaccessible. A second factor is the relative rates of breeding of both parasite and host. Others are the presence of food for the adult stages of the parasite, the suitability of environment as regards temperature and humidity, and the presence of hyperparasites. The first two factors were investigated, but the results proved unfavourable, indicating that unless the behaviour of the Chalcids under field conditions in sheep country are different from those observed in Brisbane, they are of little importance as controlling agents.

The parasites, *Dirhinus sarcophagae*, Frogg., *Pachycrepoideus dubius*, Ashm., *Hemilexomyia abrupta*, Dodd, *Chalcis dipterophaga*, Gir. & Dodd, *C. calliphorae*, Frogg., *Paraspilomicrus froggatti*, Johnst. & Tiegs, and *Spalangia muscidarum*, Richardson, are too scarce to be of economic importance.

Experiments were undertaken in Brisbane to test the economic importance of *Nasonia brevicornis*, Ashm. From these it was seen that the majority of sheep-maggot flies apparently pupate in places where the Chalcids cannot touch them, only a small number, about 4·37 per cent., which pupate on the surface, becoming parasitised. The flies breed much faster than the Chalcids, a single female *Nasonia* parasitising on an average about 20 pupae, while a single female blow-fly can deposit about 250 eggs. During the hot season blow-fly pupae, on account of their accelerated development, are more immune from effective attacks by such Chalcids as parasitise the pupal stage. The authors are therefore forced to regard this Chalcid as a greatly overestimated factor in the control of blow-flies.

The life-history of *Australencyrtus giraulti*, Johnston & Tiegs, has already been noticed [*R. A.E.*, B, x, 1]. It is abundant in Brisbane during October and November, but diminishes as the summer advances, when *N. brevicornis* becomes more plentiful. Its chief advantage is that it attacks the larval stage ; the disadvantages connected with it are its long developmental period and periodic appearance, which might be remedied by means of laboratory supplies. It seems worthy of trial under field conditions in Western Queensland. *Stenosterys fulvoventralis* [*R. A.E.*, B, x, 56] appears to be a synonym of this species.

Careful observations on the relation of *Alysia manducator*, Panz., to useful flies are necessary before it is utilised as a parasite of blow-fly larvae [*R. A.E.*, B, x, 1, 55].

ROSENBERGER (G.). **Studien über die in- und extrazellulär liegenden Rickettsien.** [Studies on the intra- and extra-cellular *Rickettsia*.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic*, xxvi, no. 4, April 1922, pp. 112–119.

Lice free from *Rickettsia prowazeki* have been found to be infested by another species, *R. rocha-limae*, Weigl.

CRUMB (S. E.). **A Mosquito Attractant.**—*Science, Garrison, N. Y.*, lv, no. 1426, 28th April 1922, pp. 446–447.

During 1919 a number of attractants were tested in order to ascertain their possible value in mosquito control. Crude mixtures of the com ponents of blood and of perspiration apparently produced faint and

erratic responses. A degree of warmth somewhat above that of the surrounding air was highly and consistently attractive to a certain percentage of the mosquitos. A joint of stove pipe placed in the woods and heated by an alcohol lamp attracted about as many mosquitos as were attracted by persons in the vicinity.

In laboratory experiments with *Culex pipiens*, heat was similarly attractive, the maximum response occurring at temperatures between 90° and 110° F., these being from 15° to 30° higher than the surrounding air. Temperatures about 120° and below 85° proved less attractive, and at 140° the mosquitos were entirely dispersed. The response was decidedly increased when the breath was passed through the warm water, used to create the high temperature, in place of the usual air current, but the admixture of various amounts of carbon dioxide with the air stream did not increase the attraction compared with that shown for undiluted air.

Several types of heat traps were tried in the field, even the crudest of which proved attractive, though the mosquitos were able to escape from all of them. In cages they feed readily on a solution of potassium arsenite in sweetened water ; this substance being highly toxic, it is suggested that it might be used as a poison bait in heat traps. Traps have also been devised in which the mosquitos are destroyed upon entering a chamber containing potassium cyanide, but these have not yet been tested in the field.

Roubaud (E.). **Sommeil d'Hiver cédant à l'Hiver chez les Larves et Nymphes de Muscides.**—*C.R. Hebdom. Acad. Sci., Paris*, clxxiv, no. 14, 3rd April 1922, pp. 964–966.

The phenomenon of hibernation in various Muscids is discussed. They may apparently be divided into two groups : (1) flies such as *Stomoxys calcitrans*, the house-fly [*Musca domestica*], *Drosophila* spp., etc., in which the advent of cold induces a suspension of activities, but in which, as soon as the temperature becomes more favourable, development continues uninterruptedly ; and (2) flies, such as *Lucilia*, etc., in which a period of inertia is essential for development. Certain pupae belonging to the latter group will not produce adults if they are not subjected sufficiently to cold.

Phibbs (G.). **The Larval Mouth-hooks of** *Hypoderma*.—*Irish Naturalist, Dublin*, xxxi, no. 3, March 1922, pp. 25–30, 6 figs.

Attention is drawn to Laake's mistake in supposing that the second-stage larva of *Hypoderma* had not been recognised before [*R.A.E.*, B, ix, 171] ; it was briefly described and figured by Carpenter and Prendergast in *Journal Dept. Agric. & Tech. Instr., Ireland*, ix, no. 3, 1909.

The occurrence of mouth-hooks in the first-stage larva of *Hypoderma bovis*, DeG., and *H. lineatum*, Vill., is discussed. From an examination of *H. bovis* taken from the gullets of cattle in Ireland, this character was found to be equally evident in the second stage.

Herzog (M. A.). **Zur Biologie der Dasselfliege.** [A Contribution to the Biology of the Bot Fly.]—*Riv. Biologia, Rome*, iii, no. 4, November–December 1921, pp. 747–780, iv, no. 1, January–February 1922, pp. 23–43.

This title covers two papers, of which only the first deals with modern advances in the knowledge of the biology of *Hypoderma bovis*, DeG., and *H. lineatum*, Vill., and in methods for combating them, while

the second is on the subject of foot and mouth disease. The information in both papers is collected from a large number of sources, a list of references to which is given at the end of the second paper.

Brèthes (J.). **Description d'un nouveau Moustique du Pérou.**—*Rev. Chilena Hist. Nat., Santiago de Chile,* xxiv, no. 2–4, March–August 1920, pp. 41–43, 1 fig.

Culex escomeli, sp. n., is described from Arequipa (Peru). This belongs to the group *C. pipiens,* L., *C. fatigans,* Wied. (*quinquefasciatus,* Say), *C. lynchi,* Brèthes, *C. bonariensis,* Brèthes, etc., from which, however, it is quite distinct.

Caballero (A.). **Nuevos Datos respecto de la Acción de las *Chara* en las Larvas de los Mosquitos.**—*Bol. R. Soc. Española Hist. Nat., Madrid,* xxii, no. 1–2, January–February 1922, pp. 61–64.

It has been shown in previous papers [*R.A.E.*, B, viii, 61 ; x, 108] that plants of the genus *Chara* produce some toxic matter that is fatal to mosquito larvae. Further experiments in this connection are here described, and demonstrate that this substance, which is soluble in water, is not accumulated in the living cells of the alga, but that it is present in water in which *C. foetida* has lived. It is therefore logical to conclude that the poison is an excretion of the plant, water in which *Chara* spp. have lived being as potent a larvicide as the plant itself. The author has made frequent surveys of the malarial district about the mouth of the River Llobregat, and has found more than 300 pieces of water, such as pools, canals, drains, etc., in which *Chara* spp. are present, and in none of these was any trace of either *Culex* or *Anopheles* found. On the other hand, practically every stretch of water where *Chara* did not occur harboured these mosquitos.

Hoffmann (W. H.). **Sobre la Mosca *Chrysops costata,* Fabr., que chupa la Sangre del Hombre, observada en Cuba.** [On *C. costata,* a Fly that sucks human Blood, observed in Cuba.]—*Sanidad y Beneficencia, Havana,* xxvi, no. 3, September 1921, p. 121. [Received 1st May 1922.]

From October 1920 to February 1921 the author was bitten on the head about a dozen times by a fly, identified as a Tabanid, *Chrysops costata,* F. *C. costata* appears to be rare at Havana, as only about 15 specimens were noticed in the course of a year.

Kala-azar Inquiry of the Indian Research Fund Association.—*Ind. Jl. Med. Res., Calcutta,* ix, no. 4, April 1922, p. v.

It is stated that Christophers considers the bodies found in the bed-bug and described as Leishman-Donovan bodies [*R.A.E.*, B, x, 72] to be a species of *Nosema,* which, if new, would be called *N. adiei.*

Patton (W. S.). **Some Notes on Indian Calliphorinae. Parts vi & vii.**—*Ind. Jl. Med. Res., Calcutta,* ix, no. 4, April 1922, pp. 635–682, 2 plates, 10 figs.

X

The general anatomy and the method of identifying the larvae and adults of Indian myiasis-producing flies are described with illustrations. The only satisfactory method of isolating a particular species during breeding experiments is to place the larvae in paper bags, care being

taken to add fresh paper as the outer layer becomes soaked with the fluid from the breeding medium so as to prevent other flies from laying their eggs under the paper. Notes are given on the most satisfactory breeding materials for the various species.

The observations here recorded with regard to the habits of *Chrysomyia bezziana*, Vill., in India are in agreement with those previously noticed [*R.A.E.*, B, ix, 53, 103]. Whereas Roubaud's and Saceghem's observations made in Africa support the above, Rovere found the eggs on the unbroken skin of animals, and it is therefore highly desirable that further observations on the life-history of *C. bezziana* should be made in Africa. In the present paper additional cases of myiasis in man and animals are recorded as due to this species. From these records it is evident that these larvae may cause rhinal, oral, aural, ocular, cutaneous and vaginal myiasis, and may be found in any form of dermal or cavity myiasis except gastro-intestinal and urinary myiasis. Present knowledge regarding the myiasis-producing flies is reviewed [*R.A.E.*, B, x, 17]; they are dealt with in three groups, viz.: the specific myiasis-producing flies, including those that breed in living tissue only; the semi-specific myiasis-producing species, which although normally breeding in decomposing animal and vegetable matter, will occasionally oviposit in living tissues, attracted by foul smelling discharges, soiled wool, or even by fresh blood; and the accidental myiasis-producing flies, in which group are included all those the eggs or larvae of which accidentally find their way into the alimentary tract.

The most important factor in the control of myiasis in India is the education of the public in the necessity for protecting themselves and their domestic animals from the attacks of *C. bezziana*. Care should also be taken to destroy all larvae from infected cases and not allow them to crawl away for pupation. The dressing, used in America as a protection against the screw-worm fly [*Cochliomyia macellaria*], consisting of equal parts of beeswax, fish-oil and carbon tetrachloride, worked up with sufficient vaseline to give the necessary consistency [*R.A.E.*, B, vi, 150], might be used with advantage in all veterinary hospitals in India, especially after the rains, when the fly is most active. In treating wounds, the larvae should be induced to leave the tissues before they are killed; for this reason it is advisable to spray the infected part with glycerine first to cause the larvae to become active and then spray with chloroform water.

These remarks apply also in the case of the semi-specific myiasis-producing flies.

PATTON (W. S.). **Notes on some Indian Aphiochaetae.** *Aphiochaeta xanthina*, **Speiser** (*repicta*, **Schmitz**; *circumsetosa*, **de Meijere**; *ferruginea*, **Brunetti), whose Larvae cause Cutaneous and Intestinal Myiasis in Man and Animals, and** *Aphiochaeta rufipes*, **Meigen, whose Larvae occasionally cause Cutaneous Myiasis in Animals.** —*Ind. Jl. Med. Res., Calcutta*, ix, no. 4, April 1922, pp. 683–691, 1 plate.

Aphiochaeta xanthina, Speis., is extremely common all over the plains of India, and has also been recorded from most of the tropical and subtropical regions of the world. The larvae are known to cause myiasis in man and animals. The fly has been bred from the dung of horses, cats and dogs, stale and decaying meat, and the dead bodies

of insects. The females will oviposit in sores, being apparently attracted by the odour from the discharge.

Both eggs and larvae probably gain entrance to the human alimentary tract in food, particularly stale meat. Monkeys were fed on the eggs and larvae on pieces of banana, but owing to the difficulty in detecting the larvae in the food, faeces, etc., the author was unable to discover whether the fly can complete its life-cycle in the alimentary tract of these animals. It may be bred indefinitely in tubes, the technique employed being described. The larvae are very hardy and can resist long immersion in various fluids, including alcohol.

The various stages of this fly, as well as of *A. rufipes*, Meig., are described and illustrated.

Gill (C. A.). **Relapsing Fever in the Punjab. (A Preliminary Report.)**—*Ind. Jl. Med. Res., Calcutta,* ix, no. 4, April 1922, pp. 747–780, 3 charts, 4 maps.

The present report is concerned with the study of conditions prevailing during 1920 in the Punjab, which discloses the fact that a severe and widespread epidemic of relapsing fever occurred during that period, causing a mortality of over 26,000 and a morbidity of probably ten times that figure. The nature of the circumstances thought to be responsible for the cyclical recurrence and seasonal periodicity of the disease will be considered in a future paper. It is evident that relapsing fever must now be regarded as endemic in the Punjab and that at more or less regular intervals it is apt to assume epidemic proportions.

The precise rôle of the carrier and the mode of the spread of the disease are dealt with by F. W. Cragg [*R.A.E.*, B, x, 142].

Gupta (B. M. D.). **A Note on some Cultural Phases of** *Leishmania donovani*.—*Ind. Jl. Med. Res., Calcutta,* ix, no. 4, April 1922, pp. 809–813, 1 plate.

The results of experiments carried out on a monkey (*Macacus rhesus*), which had previously been infected with kala-azar by an intraperitoneal injection of 10 cc. of an emulsion made from a heavily infected spleen macerated in sterile normal saline, have again raised the important question as to whether unrecognised forms of *Leishmania donovani* may not exist in the tissues of its vertebrate host; the aflagellate and granule stages seem to be merely degenerative forms. Although every attempt to obtain a positive diagnosis by examination of the films had been negative, N.N.N. cultures gave a rich yield of Leishman-Donovan flagellates on three occasions. Encystment of the parasite occurs in the mid-gut of an infected *Cimex rotundatus*, and also in N.N.N. cultures. Whether such encystment, however, is part of the true extra-human cycle, or whether it is a protective reaction on the part of the parasite to unfavourable environment, is open to question.

Huguier (—). **Traitement de l'Hypodermose chez le Cheval et le Boeuf.**—*Vie Agric. et Rur., Paris,* xx, no. 17, 29th April 1922, p. 291.

The depreciation in the value of hides in France due to *Hypoderma* is estimated at about £1 a head, and amounts to a very large sum

per annum. Prophylactic treatments suggested include the use of coverings for the animals, ear-pieces, nets, etc.; hanging bunches of twigs, fern, willow, etc. in the stables and burning these when the flies are sheltering in them; and the application of lotions such as a decoction of walnut leaves, a pulp of squashed oak bark soaked in vinegar, or infusions of such nauseous substances as asafoetida (3 per cent.), aloes (5 per mille), tobacco (100 per mille), cade (juniper) oil, or cod-liver oil. The usual method of extracting the larvae from the skin of the animals is described.

GHOSH (E.). **On a New Ciliate, *Balantidium blattarum*, sp. nov., Intestinal Parasite in the Common Cockroach (*Blatta americana*).**—*Parasitology, Cambridge*, xiv, no. 1, April 1922, pp. 15–16, 1 fig.

Balantidium blattarum, sp. n., was found in the intestinal contents of *Blatta americana* at Calcutta. It is comparatively rare and was only noticed twice. It is apparently the first species of the genus described from the intestinal tract of an Arthropod.

CUNLIFFE (N.). **Some Observations on the Biology and Structure of *Ornithodorus savignyi*, Audouin.**—*Parasitology, Cambridge*, xiv, no. 1, April 1922, pp. 17–26, 3 figs.

The technique employed throughout these observations was the same as in previous experiments [*R.A.E.*, B, x, 25]. The biology of *Ornithodorus savignyi*, Aud., as studied under laboratory conditions, proves to be very similar to that of *O. moubata*, Murr. Females may lay over 400 eggs, of which at least 60 per cent. may be fertile; parthenogenesis has not been observed. An increase in temperature of 8° C. [14° F.] from 22° C. [72° F.] decreases the longevity of the female from 775 to 358 days (*i.e.*, 45 per cent). An increase of 7° C. [13° F.] from 30° C. [86° F.] reduces the period for the production of third-stage nymphs by 26 per cent. An excess of moisture apparently reduces the vitality of the individual at each stage of growth, this being most marked after the third nymphal stage has been attained. The changes in external anatomy occurring during development are also similar to those of *O. moubata*.

ALLEN (J. A.) & WICKWARE (A. B.). **A preliminary Note on Parasites infesting domesticated Silver Black Foxes in Canada.**—*Parasitology, Cambridge*, xiv, no. 1, April 1922, pp. 27–28.

The parasites recorded include *Ctenocephalus canis*, Curt., and *Sarcoptes scabiei vulpis*, Fürst., from the body of the host, and *Otodectes cynotis*, Hering, from the external meatus of the ears. [See also *R.A.E.*, B, ix, 96.]

BEZZI (M.). **On the Dipterous Genera, *Passeromyia* and *Ornithomusca*, with Notes and Bibliography on the Non-pupiparous Myiodaria Parasitic on Birds.**—*Parasitology, Cambridge*, xiv, no. 1, April 1922, pp. 29–46.

The author's conclusions to this paper are as follows:—The flies associated with birds show a parallelism between the grades of their parasitic adaptation and their systematic position.

The lower forms (Acalyptrata) have saprophagous larvae, living in the nests of several orders of birds: Scansores, Passeres and Raptores. In the larval stage they feed upon decaying organic matter, while in the adult stage they are, in some cases, blood-sucking (*Carnus*).

The intermediate forms (ANTHOMYIIDAE) show two grades of adaptation: (*a*) lower forms, the larvae of which are mainly saprophagous or phytophagous (*Chortophila*), and which, like the Acalyptrata, live in the nests upon decaying substances; (*b*) higher forms, the larvae of which are mainly carnivorous and have adapted themselves to two modes of life—(A) as subcutaneous parasites (*Philornis*) of Scansores, Columbae and Passeres, (B) as intermittent haematophaga, on Passeres (*Passeromyia*).

The higher forms (CALLIPHORINAE) show in their larval stage the last two types of parasitic adaptation, *i.e.*, (*a*) intermittent haematophagy (*Protocalliphora*), and (*b*) possibly a subcutaneous mode of life on Passeres only.

The adult flies of all the intermediate and higher forms are non-bloodsucking. It seems to be a rule among the Diptera that the forms with haematophagous adults have non-haematophagous larvae and *vice versa*. All these facts have to be taken into consideration in the study of other parasitic flies and especially heterogeneous groups like Pupipara and the Oestrids, which undoubtedly are of polyphyletic origin.

Particulars are given of the following species and their hosts:—*Passeromyia longicornis*, Macq., from Australia; *P. heterochaeta*, Vill., from Tropical Africa, India and the Far East; *Protocalliphora coerulea*, R.-D. (*azurea*, Meig. (nec Fall.), *sordida*, Zett.), from Europe, North America and Hawaii; *P. azurea*, Fall. (*chrysorrhoea*, Macq.), from Europe and North America; *P. metallica*, Towns., from North America; *Philornis* (*Mydaea*) *pici*, Macq. (*anomala*, Jaenn.), from the Neotropical Region; *P.* (*M.*) *torquans*, Niels., from Argentina; *P. spermophilae*, Towns., from Jamaica; *Carnus hemapterus*, Nitzsch, from Europe; *Chortophila cannabina*, Stein, Kramer & Engel, from Germany; *C.* (*Hylemyia*) *nidicola*, Aldr., from U.S.A.; and *Neottiophilum praeustum*, Meig., from Central Europe.

Keys are given to the species of *Protocalliphora* and *Philornis*, and an extensive bibliography is appended.

HILL (L.). **Three New Species of** *Trichodectes* **from** *Cephalophus monticola* **and** *Procavia capensis* **from South Africa.**—*Parasitology, Cambridge*, xiv, no. 1, April 1922, pp. 63–69, 1 plate.

The new species described are: *Trichodectes bedfordi* from a blue duiker (*Cephalophus monticola*); and *T. lindfieldi* and *T. serraticus* from a Cape hyrax (*Procavia capensis*).

FERRIS (G. F.). **The Mallophagan Family Trimenoponidae.**—*Parasitology, Cambridge*, xiv, no. 1, April 1922, pp. 75–86, 8 figs.

The species dealt with include: *Harrisonia uncinata*, gen. et sp. n., from *Hoplomys gymnurus*, *Nelomys mirae* and *Proechimys semispinosus* from North Ecuador; *Cummingsia maculata*, gen. et sp. n., from *Caenolestes* sp. from Peru; and *C. peramydis*, sp. n., from *Peramys domesticus* from Brazil.

La Lutte contre le Varron [Oestrids].—*La Terre Vaudoise, Lausanne*, xiv, no. 17, 29th April 1922, p. 214.

Losses to the value of over £40,000 at par are said to occur annually in the pasture regions of Switzerland owing to the presence of Oestrids infesting cattle. The usual methods of extraction of the larvae or of destroying them under the skin are advocated.

Viton (A.). **Nociones generales sobre la Garrapata y la Tristeza del Ganado.** [General Information about Ticks and Bovine Piroplasmosis.]—*Gaceta Rural, Buenos Aires*, xv, no. 176, March 1922, pp. 931–937.

The nature of piroplasmosis in South America and its effect upon cattle are discussed. Much has been done in Argentina, where the disease is endemic, by dividing the country into zones that are tick-infested, intermediate and tick-free. This, however, is not sufficient, as it merely prevents the extension of the disease ; the campaign should be carried into the infested zones also until the tick is exterminated. Under the present system, the tick-free zone has scarcely increased at all in the course of several years. More money is required to carry out a successful campaign, the prejudice of many stock-owners has to be overcome, and there must be better co-operation between ranchers in the infested zones. The methods of the campaign in the United States are reviewed as an example, and the necessity for equal thoroughness in Argentina is urged.

Goetghebuer (M.). **Etude critique des *Ceratopogon* de la Collection Meigen conservée au Musée d'Histoire Naturelle de Paris.**—*Bull. Soc. Ent. Belgique, Brussels*, iv, no. 3–4, 4th May 1922, pp. 50–59, 10 figs.

The species that form the subject of these notes are the different types of *Ceratopogon sens. lat.* from Meigen's private collection, which may therefore be held to be the types used for the original descriptions. A number of errors are rectified. The synonymy is established for several species, the characters of which were not sufficiently elaborated in Meigen's descriptions.

The species of which the nomenclature is changed include :—*Atrichopogon lucorum*, Meig. (*sylvaticus*, Winn.), *A. winnertzi*, n. n., (*lucorum*, Winn., nec Meig.), *Bezzia annulipes*, Meig. (*solstitialis*, Winn.), *Clinohelea luteitarsus*, Meig. (*subsessilis*, Goetgh.), *Culicoides chiopterus*, Meig. (*amoenus*, Winn.), *C. nubeculosus*, Meig. (*punctaticollis*, Goetgh.), *C. obsoletus*, Meig. (*varius*, Goetgh.), *C. stigma*, Meig. (*kiefferi*, Goetgh.), *Forcipomyia bipunctata*, L. (*disticta*, Kieff.), *Palpomyia armipes*, Meig. (*rufipectus*, Winn.), *P. ferruginea*, Meig. (*fulva*, Macq.), *P. flavipes*, Meig. (*hortulana*, Meig.), *P. semifumosa*, n. n. (*hortulana*, Goetgh., nec. Meig.), *P. spinipes*, Meig. (*crassipes*, Goetgh.), and *Psilohelea niveipennis*, Meig. (*candidata*, Winn.). *Palpomyia picta*, Meig., is merely a variety of *P. fasciata*, Meig.

Macdonald (A. S.). **Observations on an extensive Human Infection by Sarcoptic Mange of the Horse.**—*The Lancet, London*, 15th April 1922. (Reprinted in *Vet. Jl., London*, lxxviii, no. 5, May 1922, pp. 166–169.)

Of a number of veterinary students engaged in post-mortem operations on a horse strongly infested with *Sarcoptes scabiei*, about 53 per cent. became infected with the mite, while of those whose hands and clothing came into direct and prolonged contact with the carcase, 100 per cent. complained of subsequent symptoms. As the morbid conditions were rapidly recognised only a few cases of a slight dermatitis were the result. In this case the mites appear to have migrated to human hosts, passing through the clothing with little delay, and setting up irritation within a period of 2–24 hours.

Ingram (A.). *Aphiochaeta xanthina*, **Speiser** (*A. ferruginea*, **Brun.**) **as an Intestinal Parasite in the Gold Coast.**—*Jl. Trop. Med. & Hyg., London*, xxv, no. 9, 1st May 1922, pp. 113–115.

Aphiochaeta xanthina, Speiser, is recorded as an intestinal parasite of man in West Africa. An account of breeding experiments with this fly is given. The pupae seem to have little power of resisting desiccation.

Waterston (J.). **Malaria in Macedonia, 1915–1919. Part V. Entomological Observations on Mosquitoes in Macedonia.**—*Jl. R.A.M.C., London*, xxxviii, no. 5, May 1922, pp. 334–349.

This paper gives a summary of the knowledge of the Culicid fauna of Macedonia. A list of the mosquitos contains twenty-six species and two varieties, and there are keys to the species of each genus. Particulars are given of the distribution and habitat of each species [*R.A.E.*, B, vi, 162, 201, etc.].

Although thousands of *Culex* larvae were reared, *C. fatigans* was never found, and all individuals suspected of being this species that were brought to the laboratory were *C. pipiens*. The egg-scattering species of mosquitos (*Anopheles* and *Ochlerotatus*) showed a partiality for laying their eggs at the edge of the container, where a thin film of water mounts the side by surface tension. Should this habit prove to be widely spread in the genus *Anopheles*, it will have to be considered when organising sanitary measures.

The larvae of a water beetle, *Acilius* sp., destroyed a large number of Culicids, but its usefulness is probably limited where many Culicines are present, as it does not attack Anophelines until the former are all destroyed.

Boyd (J. E. M.). **Entomological Notes: On a Muscid Fly breeding on a Ship at Sea.**—*Jl. R.A.M.C., London*, xxxviii, no. 5, May 1922, pp. 378–379.

The extensive and continuous breeding of *Musca* sp. on a ship at sea is recorded. There was probably some flaw in the sanitation of the ship. Although several likely breeding-places were examined, no pupae or larvae were found. Other insects on board were cockroaches, fleas, bugs, *Phthirus pubis*, and *Sarcoptes scabiei hominis*.

Cragg (F. W.). **The Epidemiology of Relapsing Fever in India.**—*Trans. R. Soc. Trop. Med. & Hyg., London*, xv, no. 8, 16th February 1922, pp. 236–252, 1 chart.

The results of the observations here described on the seasonal occurrence of relapsing fever in the United Provinces [*cf. R.A.E.*, B, x, 138] indicated the possible existence of some other carrier of the disease than the louse, though experiment has only proved *Pediculus* to be implicated.

During the cold weather the life-history of the louse is much the same as in Europe, except that owing to the character of the native clothing it is more susceptible to atmospheric conditions. One period of the early part of the hot weather is particularly favourable to the insect, but it is almost completely exterminated during the extreme dry heat of May. The rise and fall of the disease are apparently determined by much the same climatic conditions as control plague.

The seasonal prevalence of relapsing fever in India is thus explained by the reaction of the insect host of the spirochaete to a varying climate, the occurrence of epidemics being due to abnormal seasonal conditions. The absence of typhus suggests a curious phenomenon —that two diseases with the same insect vector have an entirely different seasonal prevalence and distribution within the borders of the same country. There is, however, the possibility that it has been present without being recognised.

Austen (E. E.). **Note on a Small Collection of Indian Tabanidae and other Blood-sucking Diptera.**—*Trans. R. Soc. Trop. Med. & Hyg., London*, xv, no. 8, 16th February 1922, p. 264.

The species recorded are :—The Tabanids, *Tabanus striatus*, F., *T. macer*, Big. (*bicallosus*, Ric., *trichinopolis*, Ric.), *T. ditaeniatus*, Macq., *T. albimedius*, Wlk., *T. consocius*, Wlk., *T. nemocallosus*, Ric., and *T. virgo*, Wied.; the Muscids, *Philaematomyia crassirostris*, Stein (*insignis*, Aust.), *Stomoyxs calcitrans*, L., and *Lyperosia exigua*, de Meij. ; and the Hippoboscids, *Hippobosca maculata*, Leach, and *Lipoptena caprina*, Aust. The last-named has hitherto only been recorded from goats in Palestine.

This collection also includes one species of *Haematopota*, two of *Tabanus* and one of *Stomoxys* that are probably new.

Parker (R. R.). **Australian Sarcophagidae ; New Species and Data concerning others (Diptera).**—*Canadian Ent., Orillia*, liv, no. 1, January 1922, pp. 4–9, 1 fig.

The species dealt with include *Sarcophaga froggatti*, Taylor, of which a further description is given [*R.A.E.*, B, v, 54]. This sheep-infesting species has also been recorded from the Northern Territory.

Froggatt (W. W.). **Sheep-maggot Flies. No. 5.**—*N.S.W. Dept. Agric., Sydney*, Farmers' Bull. 144, March 1922, 32 pp., 10 figs.

The various methods of controlling sheep-maggot flies by means of parasites, natural enemies, the destruction of breeding-places, trapping, spraying, dipping, crutching, dressing and jetting are described. An arsenical solution recommended for dressing blown sheep consists of 2 lb. white arsenic, 23 oz. washing soda or 6 oz. caustic soda, 2 lb. soap and 100 gals. water. If washing soda is used with the arsenic, they should be boiled together in a gallon of water until dissolved, and the soap sliced up and boiled in another gallon. The two solutions can then be mixed and made up to the 100 gals. If caustic soda is used, it does not require to be boiled with the arsenic, and after being mixed in a gallon of water, they can be added to the soap solution obtained as described above, and water added to make up 100 gals. An arsenical oil emulsion consists of 25 gals. water, 25 gals. oil, 10 lb. soap, 1 lb. white arsenic or $1\frac{3}{4}$ lb. sodium arsenite, and 12 oz. washing soda or 3 oz. caustic soda. The soap should be dissolved in 5 gals. of water by boiling, and the white arsenic or sodium arsenite dissolved in a gallon of water as described in the previous formula and added to the soap mixture. The solution should then be poured into a vessel containing 25 gals. oil until a perfect emulsion is obtained. The mixture is ready for use after adding 19 gals. warm water. If left to get cold, the mixture forms a jelly, but does not deteriorate and is restored by thorough stirring. For jetting, a mixture of 1 lb. arsenic

in 40 gals. water is strong enough to kill all maggots, and a pressure of 125 lb. sufficient to drive it through the wool.

In two appendices are given a report of the work carried out at the Warrah Sheep-fly Experiment Station during 1920–21, and further observations on sheep-maggot flies and their parasites, which have already been noticed from another source [*R.A.E.*, B, x, 55].

FROGGATT (W. W.). **Abattoir Refuse useless as Blow-fly Bait.**—*Agric. Gaz. N.S.W., Sydney*, xxxiii, pt. 4, 1st April 1922, p. 264.

Of the various mixtures experimented with, including gut slime (claimed in America to be the best bait), dried meat dissolved in water was the only one of any special value in attracting blow-flies.

PLACE (F. E.). **Blowflies and Sheep.**—*Jl. Dept. Agric. S. Australia, Adelaide*, xxv, no. 8, 15th March 1922, pp. 700–705.

It is only within the last 10 or 12 years that blow-fly infestation has been noticed among sheep in South Australia, and the trouble has arisen through vegetable-feeding flies adopting the habit of blowing sheep ; unfortunately, many species of flies that have not yet adopted this habit may at any time do so. In December and January there is but little trouble ; in March it rapidly increases and reaches its height in May, and again in October there is another sharp rise.

Preventive measures include burning or deep burying of carcasses, the use of such disinfectants as coal-tar, kerosene, sheep dip and quick-lime, the protection of birds, which destroy many flies, and the immediate burning of all maggoty wool clipped from the sheep. The maggots themselves are difficult to kill ; each site of infestation on a sheep should be opened out to the end and some volatile oil such as petrol be poured on, when the maggots will all come out. A solution of 1 drachm of perchloride of mercury in a pint of methylated spirit should be put on the wound, and this will quickly dry it up. The value of dipping, crutching and other preventive measures is discussed [*R.A.E.*, B, vii, 114 ; ix, 156, etc.]. A solution of 1 to 5 per cent. of copper sulphate is useful in destroying maggots and assisting healing, but has the disadvantage of discolouring the wool. Many flies may be caught in the simplest of traps, such as a kerosene tin with the top cut off and replaced by cheese cloth, with two or three small holes along one edge. This, laid on its side with a bait of meat inside, is very effective. In isolated paddocks it is often more convenient to poison a carcass with such a mixture as 1 lb. white arsenic, 2 lb. washing soda and 3 lb. sugar boiled for two hours in a kerosene tin full of water.

FERGUSON (E. W.). **Rats and Fleas in their Relation to Plague.**—*Australian Mus. Mag., Sydney*, i, no. 4, March 1922, pp. 114–117, 4 figs.

A brief account is given of the rôle played by rats and fleas in the transmission of disease. The species of fleas occurring on rats in Sydney are *Xenopsylla cheopis*, *Ceratophyllus fasciatus*, and *Ctenopsylla musculi*. The necessity for the control of rats and fleas is emphasised.

The New Cattle-tick Regulations.—*N.Z. Jl. Agric., Wellington*, xxiv, no. 3, 20th March 1922, pp. 188–191.

These amended regulations for the eradication and prevention of spread of the cattle-tick in the Dominion came into force on 16th February 1922, and supersede those dated 2nd October 1919 [*R.A.E.*, B, viii, 34].

NÖLLER (W.). **Die wichtigsten parasitischen Protozoen des Menschen und der Tiere. I. Teil.** [The most important parasitic Protozoa of Man and Animals. Part I.]—*Berlin,* Richard Schoetz, 1922, 272 pp., 113 figs., 3 coloured plates. Price 450 marks.

This is the first part of Dr. Nöller's work in the first volume of "Die tierischen Parasiten der Haus- und Nutztiere" [The Animal Parasites of Domestic Animals and of Animals of Economic Value], by Ostertag, Wollfhügel and Nöller.

It comprises an introduction to the general knowledge and investigation of parasitic Protozoa with a special section on the parasitic Rhizopoda. It is intended for medical men, veterinarians and zoologists, and gives a survey of the parasitic Protozoa with the object of supplying the need for a comprehensive review, without in any way claiming to replace original treatises as regards a close study of the various forms. This aim is assisted by the copious bibliographies at the end of each section.

FRANCHINI (G.). **Amibes et autres Protozoaires de Plantes à Latex du Muséum de Paris. (Note préliminaire.)**—*Bull. Soc. Path. Exot., Paris,* xv, no. 4, 12th April 1922, pp. 197–203.

Following some initial research on a parasite in the latex from two species of Apocynaceae [*R.A.E.*, B, x, 112], other latex-bearing plants, nearly all under glass, have been examined.

Euphorbiaceae contained trypanosomes, *Amoeba,* and in one case small parasites similar to *Leishmania.* Asclepiadaceae were parasitised by *Amoeba.* In Apocynaceae, *Amoeba* is common in the latex and in one species some Herpetomonads occurred. In the Urticaceae, *Amoeba,* trypanosomes and leishmaniform bodies occurred in a number of species of *Ficus.* In Artocarpaceae, *Amoeba* was not rare. In Sapotaceae, *Amoeba,* Herpetomonads and Protozoa that looked like trypanosomes without a flagellum were seen.

After various attempts, the culture of *Amoeba* succeeded when fresh latex of *Strophanthus rigali* and *S. scandens* was placed on Nöller plates (defibrinated horse-blood jelly). Up to the time of writing, two trypanosomes had been found in smears from mice that had been inoculated peritoneally.

The chief point of interest is in the discovery of numerous *Amoeba* in the latex of a variety of plants, which does not appear to have been reported previously. In order to classify the Protozoa that have not been determined the greenhouse insects must be identified, for although many of the plants must have been infected when imported, it is likely that others have been infected through insect agency. It is intended to examine the mosquitos and flies (*Lucilia* and *Sarcophaga*) occurring in the greenhouses. It is improbable that *Stenocephalus* occurs in the greenhouses of the Jardin des Plantes at Paris.

FRANCHINI (G.). **Remarques à propos de la note de M. França sur la Flagellose des Euphorbes.**—*Bull. Soc. Path. Exot., Paris,* xv, no. 4, 12th April 1922, pp. 205–207.

Referring to França's paper [*R.A.E.*, B, x, 121], the author thinks that while awaiting further research on the subject, it is prudent to adopt the hypothesis that flagellosis of *Euphorbia* is transmitted by several species of insects.

In a footnote Roubaud agrees with the author regarding the numerous hosts of *Leptomonas davidi* among the Rhynchota occurring on *Euphorbia*. The presence of *Stenocephalus* is not necessarily associated with flagellosis. In 1911 Bouet and Roubaud transmitted flagellosis mechanically by means of *Dieuches humilis*, a fact that seems sufficient to explain the generalisation of the infection in *Euphorbia* without assuming an intermediary development.

Van den Branden (—) & Van Hoof (—). **Recherches sur la Fièvre récurrente africaine.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 4, 12th April 1922, pp. 220–229.

Experiments are described which prove that the flying-fox, *Cynonycteris straminea*, is not susceptible to infection by the spirochaete of African relapsing fever, *Spirochaeta duttoni*, transmitted by *Ornithodorus moubata*. *In vitro*, even after three hours, the blood of this bat does not affect the vitality of the spirochaete, but the latter rapidly disappears from the blood-stream.

Specimens of *Ornithodorus moubata* have been received from various localities in the Lower and Middle Congo regions. If the tick occurs throughout the bush areas there, it is certain that endemic centres of the spirochaetal infection must already have been established. One has been revealed in the course of clinical observations, and several specimens of the tick were obtained from the same place. Further research should disclose fairly numerous centres of infection in all districts where the conditions enable the tick to survive.

Rodhain (J.). **Sur la Réceptivité des Roussettes épaulières,** *Epomophorus wahlbergi haldemani* **(Hallowel) et** *Epomophorus pusillus* **(Peters) aux** *Trypanosoma gambiense* **(Dutton) et** *congolense* **(Broden).**—*Bull. Soc. Path. Exot., Paris*, xv, no. 4, 12th April 1922, pp. 246–253.

Following on experiments with *Cynonycteris straminea* [*R.A.E.*, B, iv, 101], it has been found that two other African bats, *Epomorphorus* spp., are susceptible to trypanosome infection. They were infected with *Trypanosoma congolense* and *T. gambiense*. The former produces fatal infection of the acute type, while the latter gives rise to the chronic type, of which the duration and severity remain to be investigated. The work done hitherto demonstrates the more general infective power of *T. gambiense* as compared with *T. congolense* and *T. cazalboui*.

Muraz (G.). **Essai de Détermination de la Limite nord de la Maladie du Sommeil en Afrique équatoriale française. Travaux du Secteur de Prophylaxie du Tchad d'Avril 1920 à Avril 1921.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 4, 12th April 1922, pp. 253–280, 1 map.

Sleeping sickness does not appear to be of recent introduction in the region south of Lake Chad. In the last few years it has been localised, especially on the banks of certain rivers, large zones that are nearly free separating regions that are severely affected. The northern limit-line of sleeping sickness in French Equatorial Africa passes between the 9th and 10th degrees of north latitude. The extension of the disease north of this line is not to be feared, provided that the present prophylactic work is carried on and the posts at which traffic is inspected and passed are maintained.

Geographical conditions seem to militate against an extension northwards, as the favourite forest habitat of *Glossina palpalis* disappears north of the 10th degree. The data at present available do not, however, permit of tracing with certainty the northern limit of *G. palpalis*. *G. morsitans* and *G. tachinoides* are very common in the region south of the Chad, *G. palpalis* is rare, and *G. fusca* was not met with.

The Tabanids, *Tabanus thoracinus*, *T. taeniola* and *Haematopota strigipennis*, were captured in one locality.

Balard (G.). **[A Natural Enemy of Adult Mosquitos.]**—*Gaz. Heb. Sci. Méd. de Bordeaux*, 24th July 1921. (Abstract in *Ann. d'Igiene, Rome*, xxxii, no. 3, March 1922, p. 230.)

Ploiaria (*Emesodema*) *domestica*, a Reduviid bug common indoors in the south of France, is recorded as preying on adult mosquitos.

Yamada (S.). **Descriptions of ten New Species of *Aëdes* found in Japan, with Notes on the Relation between some of these Mosquitoes and the Larva of *Filaria bancrofti* Cobbold.**—*Annotationes Zoologicae Japonenses, Tokyo*, x, no. 3, October 1921, pp. 45–81, 4 figs. [Received 8th June 1922.]

The new species are: *Aëdes galloisi*, *A. watasei*, *A. omurensis* and *A. esoensis*, from various localities in Japan; *A. flavopictus*, from Japan and Korea; *A. chemulpoensis* and *A. seoulensis*, from Korea; and *A. horishensis*, *A. formosensis* and *A. hatorii*, from Formosa.

Of 13 species of *Aëdes* examined, *A.* (*Culicelsa*) *togoi*, Theo., a common mosquito in Japan, proved to be able to serve as an intermediate host for *Filaria bancrofti*, but similar experiments with *A. galloisi*, *A. chemulpoensis* and *A. esoensis* proved negative.

Senevet (G.). **Monstruosités chez deux Tiques.**—*Bull. Soc. Hist. Nat. Afr. Nord., Algiers*, xiii, no. 4, 15th April 1922, p. 95, 2 figs.

The abnormalities dealt with occurred in *Hyalomma aegyptium* and *Rhipicephalus appendiculatus*.

Senevet (G.). **Présence à Alger d'un Insecte fort gênant pour l'Homme.**—*Bull. Soc. Hist. Nat. Afr. Nord, Algiers*, xiii, no. 4, 15th April 1922, pp. 97–98.

A thrips, *Gynaikothrips uzeli*, Zimm., swarmed in certain parts of Algiers during the summer of 1920, sometimes forming dense clouds and causing great annoyance. Specimens that fall on the conjunctiva of the eye cause acute pain that subsides very slowly, and individuals on the skin appear to bite [*cf. R.A.E.*, B, ix, 175].

Riley (W. A.). **The Reputed Vesicating Properties of the Granary Weevil,** *Calandra granaria*.—Reprint from *New Orleans Med. & Surg. Jl.*, lxxiv, no. 10, April 1922, 4 pp.

From experiments undertaken and the work of previous authors on this subject, it is clear that *Calandra granaria* does not contain cantharidin, and there seems no basis for the theory that the presence of the remains of this weevil in flour is responsible for cases of poisoning.

Mayne (B.). **How long does a Mosquito retain Malaria Parasites?** —*Pub. Health Repts., Washington,* xxxvii, no. 18, 5th May 1922, pp. 1059–1063.

The observations here recorded were made in a preliminary study to determine the maximum length of time the malarial parasite will remain viable in infected mosquitos, as well as the longevity of Anophelines. *Plasmodium vivax* and *P. praecox* (*falciparum*) were the parasites studied.

The longest period of survival of uninfected Anophelines under artificial conditions on a diet of split dates and water at a temperature of 45° to 75° F. was 231 days; 85 individuals of *A. punctipennis*, kept without blood, lived an average of 90·4 days, 8 of these remaining alive for 175 to 203 days. When given 1 to 3 feeds of blood followed by a diet of fruit juices, 22 specimens of *A. punctipennis* lived for an average of 100 days, 6 living 176 to 217 days; 6 individuals of *A. quadrimaculatus* lived 73 days, and 4 of *A. crucians* 65 days. A single specimen of *Culex territans* survived 265 days on a diet consisting exclusively of fruit juices, at a temperature of 48° to 76° F.

Malarial parasites distinctly recognisable by their morphology and staining were detected in the salivary glands of five individuals of *A. punctipennis*, 68, 70, 71, 83 and 92 days, respectively, after infection. These mosquitos had been allowed to bite a crescent carrier on a single occasion and were maintained at room temperature of 59° to 83° F. for six days, being then placed in a container at a temperature of 44° to 78° F. for the remainder of the experiment.

An inoculation experiment on a human host proved successful 55 days after the infection of the mosquito. Mosquitos failed to convey malaria by biting 61, 66 and 67 days, respectively, after becoming infected (gland sporozoites obtained). These three mosquitos were kept under conditions identical with those in which viable sporozoites were demonstrated in the five specimens mentioned above.

Johnson (C. W.). **Notes on Distribution and Habits of some of the Bird-flies, Hippoboscidae.**—*Psyche, Boston, Mass.*, xxix, no. 2, April 1922, pp. 79–85, 1 fig.

The species dealt with are:—*Ornithoica confluenta*, Say, *Ornithomyia anchineuria*, Speis., *Olfersia albipennis*, Say, *O. americana*, Leach, and *Olfersia* sp. on various birds from the United States; *Ornithoctona erythrocephala*, Leach, on birds from Cuba, Porto Rico, Dominica and Quebec; *Pseudolfersia fumipennis*, Sahlberg, on various birds from the United States; and *P. spinifera*, Leach, from a cormorant in the Bahamas.

Macdougall (R. S.). **Insect and Arachnid Pests of 1920.**—Separate from *Trans. Highland & Agric. Soc. Scotland*, 1921, pp. 35–37, 2 figs. [Received 24th May 1922.]

Owing to the frequent confusion of the Hippoboscid fly, *Melophagus ovinus*, and the tick, *Ixodes ricinus*, on sheep, their anatomy and habits are contrasted in parallel columns.

Gáudara (G.). **El Piojo Blanco del Hombre.** [The White Louse of Man.]—*A Folha Medica, Rio de Janeiro,* iii, no. 6, 31st March 1922, pp. 43–46.

This article on *Pediculus humanus* (*vestimenti*) gives particulars of the history, biology and physiology of this louse and describes various remedial measures.

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Swellengrebel (N. H.). **Twee, voor Nederlandsch-Indië, nieuwe Anophelinen.** [Two Anophelines new to the Dutch East Indies.] —*Nederl. Tijdschr. v. Geneesk.* [*sine loco*], 1922, I Helft, no. 15, pp. 1535–1536.

Anopheles brevipalpis, Roper, is described from Bangka, and the characters differentiating *Anopheles* (*Neomyzomyia*) *punctulatus*, Dön., from New Guinea, from *A. annulipes* (*punctulatus*) var. *moluccensis*, Sw., are given.

Henry (M. A.). **Sur le Pouvoir acaricide de quelques Substances utilisées dans la Gale des Equidés.**—*Rec. de Méd. Vét.*, 30th September 1921, p. 357. (Reprinted in *Ann. Méd. Vét., Brussels*, lxvii, no. 4, April 1922, pp. 179–182.)

The antipsoroptic value of a remedy depends on a number of factors including wetting power, harmlessness to the skin, cost and acaricidal power. An investigation of 15 of the substances usually employed against mites was made, all the information being tabulated. Sulphurous anhydride, $2\frac{1}{2}$ parts in solution in 100 parts oil, such as ground-nut oil, is the best preparation obtainable for practical purposes, while a tepid aqueous emulsion of cresyl of 1–2 per cent. strength is the most effective disinfectant. The effect of heat on cresyl is remarkable, a 1 per cent. emulsion at 37° C. [98·6° F.] being quite as effective as pure cresyl at a normal temperature. The value of Helmerich's ointment [*R.A.E.*, B, vi, 111] seems to lie in its effect on the removal of crusts and the consequent automatic cleansing of the skin.

Martini (E.). **Die Eidonomie der Flöhe, als Beweis für ihre stammesgeschichtliche Herkunft.** [The External Anatomy of Fleas as a Proof of their Racial Descent.]—*Centralbl. Bakt., Paras. Infektionskr., Jena*, Ite. Abt., Orig., lxxxviii, no. 3, 22nd May 1922, pp. 205–221, 2 figs.

The view is expressed that fleas are a sub-order, Aphaniptera, of the Coleoptera. This sub-order, derived from the Staphylinoidea, should be treated (as is the case with Stylopidae) as separate from the true beetles. It comprises the one family Pulicidae.

Viton (A.). **Las Garrapatas.** [Ticks.]—*Gaceta Rural, Buenos Aires*, xv, no. 177, April 1922, pp. 1041–1051, 8 figs.

The general structure of Ixodids is discussed, and the life-history and habits of *Boophilus* (*Margaropus*) [*annulatus*], the vector of bovine piroplasmosis, are described. The most favourable period for development in Argentina is from January to April; the virulence of the tick increases with succeeding generations, and the life-cycle is then at its shortest. Particular attention should be given to cattle at this time, lest native animals lose their natural resistance and imported ones that have been artificially immunised meet with such virulence that they lose their acquired immunity.

Martini (E.). **Zur Nomenclatur der für Mitteleuropa wichtigsten Stechmücken.** [A Contribution to the Nomenclature of the most important Central European Mosquitos.]—*Ent. Mitt., Berlin*, xi, no. 3, 25th May 1922, pp. 106–126.

The nomenclature adopted in recent publications on mosquitos by Edwards [*R.A.E.*, B, x, 17, etc.] and Séguy [ix, 144; x, 30] differs

materially from that employed by the author in 1920, and the views of the first-named seem to have influenced the names adopted by Wesenberg-Lund [ix, 82] and Lang [viii, 139]. In the author's opinion the nomenclature of the writers named cannot be accepted in many particulars, even from the standpoint of the rules governing nomenclature. He therefore examines the most important publications up to and including those of Meigen, and discusses the synonymy of the various species as differentiated by modern technique.

Schüffner (W.) & Hylkema (B.). **Malaria in Belawan during the Construction of the Ocean-Harbour.**—*Meded. Burg. Geneesk. Dienst Ned.-Indië, Batavia,* English edn., 1922, no. 1, pp. 47–79, 18 figs., 1 map, 3 charts, 6 tables.

Belawan is an alluvial island in the delta of the Deli and Belawan rivers, Sumatra, where the construction of a sea-harbour was begun in 1917. The authors' investigations there extended from 1918 to 1920. Like the entire littoral zone, the island is densely overgrown with mangrove forests. Only a small portion was used for the harbour works, near which the village was situated. The remaining area, intersected by creeks, was regularly flooded by the tide until dykes forming part of the new works effected a gradual change, resulting in the formation of new breeding-places and consequent increase of *Anopheles ludlowi.* Virgin mangrove forests are almost free from malaria, and it is almost certain that Belawan first became malarious owing to the construction of the railway and port in 1885–88.

In their modification of the official sanitation plan the authors urged that a cleared isolation zone of 550 yards was useless in view of the innocuousness of the mangrove forest and the radius of flight of *A. ludlowi*, that any clearing needed for enlarging the settlement should be immediately followed by reclamation work on the cleared area, and that no subsequent felling or digging should be allowed in the mangrove forests within a radius of two miles from the settlement.

In 1919 about 300 Chinese labourers came to carry on the actual harbour work, and by 6th June many cases of malaria occurred, two-thirds being malignant tertian. By September this focus of infection was no longer present, and in the subsequent months a complete change in the Anopheline fauna occurred. *A. ludlowi* decreased, and the few other species that occurred soon disappeared, so that by December the island was almost free from Anophelines. This state of things obtained in 1920 also.

The larvae found at Belawan were *A. umbrosus*, in small numbers in the forest in muddy, shaded pools and holes not regularly flooded by the tide; *A. hyrcanus* (*sinensis*) in small numbers, chiefly in salt water; and *A. ludlowi*, the most common species, only on the cleared areas. In July 1918 *A. ludlowi* left the small pools among grass, where it had been observed since the early part of the year, and bred in large, fishpond-like pools which had become suitable in the intervening six months. Swellengrebel has pointed out a similar change of habitat [*R.A.E.*, B, vii, 53], which may nullify the effect of measures against specific breeding-places. Newly-formed pools, due to excavations or reclamation work, require from one to six months or more to become suitable for the mosquitos, the time being longer the easier the communication with the open sea, as the growth of vegetation adapted to the hatching of the eggs of *A. ludlowi* is thereby delayed. Brackish water favours *A. ludlowi*, the development of which continued in water

with a salt content between 0·4 and 12·5 per mille, in one instance larvae being found in a pool with a salt content of as much as 21·7 per mille, owing to evaporation. It is necessary either to shorten the period between clearing and reclaiming, or to arrange for a free communication with the sea in order to prevent the salt content being decreased by rain water. *A. umbrosus* was caught once only, though the larvae were not difficult to find. It is doubtful whether this species is a malaria carrier in Sumatra.

The endemic malaria was characterised by the frequent occurrence of quartan together with malignant tertian. The latter was of a very severe character, a fact that the authors have noticed in all epidemics due to *A. ludlowi*, which was the only carrier present.

A comparison of the infection index figures of mosquitos captured in dwellings and of those from adjacent buffalo sheds, which are provided with mosquito traps or themselves act as traps, shows that the former are considerably higher and points to a tendency of *A. ludlowi* to stay at a place that has been once chosen. The location of buffalo trap-sheds appears to be of great importance as regards results. A position on open ground—at a distance of 10–20 yards from the dwellings—instead of among trees seems preferable, but actual tests should be made until the best position is ascertained. Buffalo sheds built underneath dwellings required a few days o become attractive to mosquitos. The experiments point to buffalo sheds being—under favourable conditions—extraordinarily attractive to *A. ludlowi* and other mosquitos. One buffalo may divert most of the *A. ludlowi* from the dwellings of 100 people. Furthermore, a buffalo shed is a reliable indicator of the changes in the Anopheline fauna in a certain area.

Jaarverslag der Malariacommissie voor Noordholland over 1921. [Annual Report for 1921 of the Malaria Committee for the Province of North Holland.]—Reprint, dated May 1922, from *Verslagen en Meded. Volksgezondheid* [*sine loco*], 26 pp., 1 map, 2 figs.

Near Amsterdam the first Anopheline larvae, apparently those of *Anopheles bifurcatus*, were seen on 16th March. The first find of larvae of *A. maculipennis* was made on 29th April, and the first males on 16th May. These dates were earlier than in 1920 [*R.A.E.*, B, x, 19].

The drying up of many canals owing to the abnormal summer drought was unfavourable to Anophelines. The admission of sea-water increased the salt content of inland waters, but the gradual change seems to have had little effect on the larvae. The mosquitos were active for a somewhat longer period owing to the warm autumn.

A general campaign against the larvae is impracticable in the reclaimed lands. By spraying ponds with 30–40 gm. of creolin per square metre (about 1–1⅓ oz. per 11 sq. ft.) nearly all animal life was killed, but four weeks later many larvae and some pupae occurred in them. A spray of finely divided liquid paraffin also killed the larvae.

Work against the adult Anophelines indoors was done only in winter, being stopped in March. Spraying with a 3 per cent. solution of lysol was the best measure for large scale work. The adults prefer stables and pigsties to cowsheds. Rabbit burrows in the dunes and underground passages in fortifications were not infested, though the latter harboured many *Culex*.

A table, covering two years from January 1920 to December 1921, shows the percentage of infection in Anophelines captured in dwellings

where malaria had occurred. Few infections occur in the summer months, but a sharp rise begins in September. In the winter of 1920 a rapid fall occurred in December, whereas in the winter of 1921 this began in January 1922. Mosquitos found infected in December and spring only harbour a residual infection in the stomach cysts, sporozoites being absent. The temperature in winter and early spring is below 15° C. [59° F.], so that mosquitos cannot contract infection. In summer probably more individuals become infected, but they escape out of doors and are lost among those from animal quarters and members of new generations.

The importance of killing adult mosquitos in malarial dwellings from September to December is obvious, but there is no advantage in doing so in summer.

LAMBORN (W. A.). **Some Problems of the Breeding-places of the Anophelines of Malaya : A Contribution towards their Solution.** —*Bull. Ent. Res., London*, xiii, pt. 1, May 1922, pp. 1–23, 1 fig., 6 tables.

From a review of previous literature and the author's own investigations, it is evident that no conclusions sufficiently valid to be of any practical value can be drawn from the characters of the environment as to the species of mosquito larvae likely to be found in a given breeding-place. Anophelines are selective to a high degree, but this tendency depends apparently on factors other than the mere environment of the breeding-place. In attempting to solve this problem with regard to the Anophelines of Malaya, the factors under consideration were the presence of other mosquito larvae in the water, and its odour and constitution. The investigation was largely restricted to *Anopheles minimus aconitus*, which is one of the dominant Anophelines in the Malay States. From October to April, this species almost outnumbered the larvae of seven others taken at the same time. Up to the end of October there was an overwhelming dominance of this species, after which a sudden relative increase of others occurred. From a collection of 10,549 larvae from a very large artificial pond about 50 yards square, used for cultivation of fish, only two individuals of *A. minimus aconitus* were taken, although the collection was made between October and April. The absence of reeds, the size of the pond and depth of the water have apparently no bearing on the matter, as these larvae have been found in other similar breeding-places. It is supposed that some quality of the water affects the distribution of *A. minimus aconitus* either directly or indirectly by influencing the character of the food. It was hoped to determine the nature of this quality by water analysis, but the investigations were interrupted before any final conclusions were arrived at. The transference of newly-laid ova into waters different from those in which they are usually found did not prevent hatching. Under laboratory conditions the larvae of various open country species could be bred to maturity in natural media in which numerous examinations had constantly shown the entire absence of the species under experiment. All common Anophelines could be bred from the egg in a medium in which only *A. vagus* existed in nature ; even the experiments with *A. ludlowi* were successful, although this species is limited in the Malay States, though not in Java, to the coastal region, owing to its preference for brackish water. *A. umbrosus* entirely disappeared from a breeding-place as a result of clearing the surrounding bush, being replaced by

A. hyrcanus and *A. barbirostris*, as was expected. Whether the larvae of *A. umbrosus* died as the direct result of the exposure to the sun could not be ascertained, but its disappearance could hardly have been due to the fouling of the water by the matter which fell in during the clearing, as this also occurs in its normal habitat. Whatever the causes they are apparently trivial ones, and when ascertained will no doubt lead to the discovery of some less expensive and more scientific method of control of Anophelines than by oiling the breeding-places.

EDWARDS (F. W.). **Mosquito Notes, III.**—*Bull. Ent. Res., London,* xiii, pt. 1, May 1922, pp. 75–102, 3 figs.

A collection of mosquitos from Paraguay includes the new species :—*Wyeomyia* (*Phoniomyia*) *fuscipes, Psorophora* (*Psorophora*) *pallescens, P.* (*Janthinosoma*) *fiebrigi, P.* (*J.*) *purpurascens, P.* (*Grabhamia*) *varinervis*, and *Aëdes* (*Ochlerotatus*) *stigmaticus.*

Sabethines collected in British Guiana include the new species *Wyeomyia bodkini* and *W. flavifacies.*

Aëdes (*Stegomyia*) *woodi*, sp. n., is described from Nyasaland.

Since the publication of the author's paper on the African species of *Culex* [*R.A.E.*, B, ii, 95], additional characters have been discovered that aid in the discrimination of some closely allied forms and the separation of the species into groups. The method of classifying the genus is discussed. The Ethiopian species of *Culex* may be divided into four main groups, to which must be added, perhaps as distinct subgenera, the four other minor groups, *Protomelanoconion, Micraëdes, Culiciomyia* and *Eumelanomyia*, all of which show affinity in one way or another with the fourth of the main groups. These main groups are briefly considered. The first, *bitaeniorhynchus* group, is evidently a natural one and includes all but two of the ringed-legged species; it is divided into two series, the *bitaeniorhynchus* and the *sitiens* series. The second group, the *duttoni* group, is not very clearly marked from the third, the *pipiens* group. The latter includes the majority of the Ethiopian species and is subdivided into the *pipiens* and *decens* series. The fourth group, the *rima* group, corresponds more or less to Dyar's subgenus *Neoculex*. The species dealt with include *Culex ornatothoracis*, Theo., previously recorded as a synonym of *C. decens*, Theo., var. *invidiosus*, Theo., but now thought to be distinct; *C. kingianus*, sp. n., from Sudan, South Nigeria and Ashanti; and *C.* (*Culiciomyia*) *cinerellus*, sp. n., from Uganda, Sudan and S. Nigeria. *Culex horridus*, n. n., is proposed for *Protomelanoconion fusca*, Theo. (Mon. Cul. v, p. 463, 1910), as *fuscus* is preoccupied in *Culex* by *Trichorhynchus fuscus*, Theo.; *Culex albiventris*, n. n., is proposed for *Eumelanomyia inconspicuosa*, Theo. (Mon. Cul. v, p. 240, 1910), as this is preoccupied by *Aëdes inconspicuosus*, Theo., both species really belonging to *Culex.*

Culex tigripes, Grp., should be transferred to the genus *Lutzia*, which is regarded as distinct from *Culex.*

Notes are given on the mosquitos collected at Karwar, North Kanara, India, which include two new species, *Uranotaenia recondita* and *Aëdes* (*Finlaya*) *cogilli.*

Other new species, recorded from Northern and Eastern Australia, are :—*Aëdes* (*Chaetocruiomyia*) *humeralis, A.* (*Finlaya*) *auridorsum, A.* (*F.*) *quinquelineatus, A.* (*F.*) *pecuniosus, A.* (? *Skusea*) *aurimargo*, and *Culex* (*Lophoceratomyia*) *hilli*. *Aëdes* (*Chaetocruiomyia*) *spinosus* n. n.,

is proposed for *Chaetocruiomyia sylvestris*, Theo. (Mon. Cul. v, p. 196, 1910), nec *Culex sylvestris*, Theo. [=*Aëdes vexans*, Mg.] (Mon. Cul. i, p. 496, 1901). *Armigeres lacuum*, sp. n., from the New Guinea Region, and *Rachionotomyia caledonica*, sp. n., from New Caledonia, are described.

Further descriptions are given of *Bironella gracilis*, Theo., and *Leptosomatomyia lateralis*, Theo.

Certain corrections and additions are made with reference to a previous paper [*R.A.E.*, B, x, 17]. The following species should be added to the Palaearctic list :—*Aëdes* (*Stegomyia*) *galloisi*, Yam., *A.* (*S.*) *flavopictus*, Yam., *A.* (*S.*) *chemulpoensis*, Yam., *A.* (*Finlaya*) *watasei*, Yam., *A.* (*F.*) *seoulensis*, Yam., *A.* (*Ecculex*) *omurensis*, Yam., which is a synonym of *A.* (*E.*) *alboscutellatus*, Theo., and *A.* (*Aëdes*) *esoensis*, Yam. [*R.A.E.*, B, x, 147]. An examination of further specimens of *A. zammitti*, Theo., proves this species to be clearly distinct from *A. mariae*, Serg. *A. berlandi*, Séguy [*R.A.E.*, B, ix, 193] is considered to be at most a variety of *A. pulchritarsis*, Rond. According to Dyar, *A. rostochiensis*, Mart., is specifically distinct from *A. cataphylla*, Dyar. *Culex wahlgreni*, Theo., should be added to the synonyms of *Aëdes geniculatus*, Oliv. According to Yamada, it is doubtful if *A. argenteus*, Poir., occurs in Japan proper. There may have been some mistake in Theobald's record, and the specimen on which it was founded is not now in the British Museum.

Patton (W. S.). **Notes on the Calliphorinae. Part I. The Oriental Species.**—*Bull. Ent. Res., London*, xiii, pt. i, May 1922, pp. 109–113.

In this and succeeding notes the author proposes to collect all the results of his studies, with a view to revising later the species of blow-flies. Those dealt with in the present paper are :—*Chrysomyia bezziana*, Vill. ; *C. megacephala*, F. (*dux*, Escholz, *flaviceps*, Macq., *remuria*, Wlk., *bata*, Wlk., *duvaucellii*, R.-D.) ; *C. albiceps*, Wied. (*putoria*, Wied., *albiceps* var. *bibula*, Wied., *rufifacies*, Guér., *orientalis*, Macq., *himella*, Wlk., *emoda*, Wlk., *elara*, Wlk., *bengalensis*, R.-D., *dejeani*, R.-D.) ; *C. villeneuvei*, Patton ; *C. combrea*, Wlk. (*defixa*, Wlk., *pinguis*, Wlk., *nigriceps*, Patton) ; *C. marginalis*, Wied. (*regalis*, R.-D., *arabica*, R.-D., *nigripennis*, Hough) ; *Lucilia argyricephala*, Macq. (*temperata*, Wlk., *serenissima*, Wlk., *indica*, R.-D.) ; *L. inducta*, Wlk. (*craggi*, Patton) ; *L. pulchra*, Wied. (*phellia*, Wlk.) ; *L. metilia*, Wlk. (? *ballardi*, Patton) ; *L. sericata*, Meig., recorded for the first time from North West Frontier Province, India ; and *C. aucta*, Wlk., a common Indian species and probably mistaken for *C. erythrocephala* [*cf. R.A.E.*, B, ix, 103 ; x, 73].

There is some doubt as to the identity of Wiedemann's species *albiceps* and *putoria*. *Musca albiceps* was described from the Cape, whereas *M. putoria* is from Sierra Leone. The males of these species are separated on the structure of the front both by Major Austen and Dr. Villeneuve. The author has examined a long series of both species from various localities, using these characters, and has found certain differences between the species from Palestine and those from India. Most of the specimens collected on the White Nile and in Sierra Leone agree with the Indian form. It is evident that there are two distinct forms, which merge into each other ; both, therefore, are for the present placed under *albiceps*.

MILLER (D.). **A remarkable Mosquito,** *Opifex fuscus,* **Hutton.**—*Bull. Ent. Res., London,* xiii, pt. 1, May 1922, pp. 115–126, 24 figs.

In view of the remarkable characters of the adult and pre-adult stages of the mosquito, *Opifex fuscus*, Hutton [*R.A.E.*, B, ix, 133], a new subfamily, OPIFICINAE, is proposed for its reception. An account is given of these stages with a revised outline of the generic characters. *O. fuscus* is restricted to the rocky coast line in New Zealand, breeding in semi-saline pools left by high tides. A large number of adults emerge in the early spring, having passed the winter as larvae or pupae. The larvae are carnivorous and cannibals. According to H. B. Kirk, the eggs are laid singly upon rocks.

NOC (—). **Rôle des Mouches en Pathologie intestinale. Prophylaxie.**—*Bull. Soc. Méd.-Chirurg. Française de l'Ouest-Afr., Dakar,* x, no. 10, December 1920, pp. 280–283.

During an epidemic of bacillary and amoebic dysentery at Dakar in 1920, an increase in the number of flies was noted. Flies captured in the native hospital did not harbour amoeboid cysts, but one taken near the latrines had in its proboscis a number of living filariform larvae that were not identified. Some fly larvae taken on a patient were behaving like those found in cuticular myiasis—in a position perpendicular to the skin and making efforts at suction. Though these two isolated observations do not permit of any general conclusion, they may indicate the beginning of a new habit, such as may lead to variations in a species, or be the beginning of a new form of parasitism.

NOC (—) & NOGUE (—). **Un nouveau Cas de Porocéphalose humaine.**—*Bull. Soc. Méd.-Chirurg. Française de l'Ouest-Afr., Dakar,* x, no. 10, December 1920, pp. 284–286.

A fatal case of internal infestation by the larvae and nymphs of an Arachnid, *Porocephalus armillatus*, is described.

LUISI (—). **La Maladie du Sommeil au Togo et particulièrement dans le Cercle de Klouto, anciennement Misahohé.**—*Bull. Soc. Méd.-Chirurg. Française de l'Ouest-Afr., Dakar,* iii, no. 16, June 1921, pp. 94–102.

Sleeping sickness is a widespread disease in French Togoland. *Glossina palpalis* occurs not only in its usual habitat but on the grassy steppes and even in houses. The conclusions of former German observers in Togo on the whole agree with these findings. This widespread distribution of *G. palpalis* renders doubtful the success of measures against it.

MESNIL (F.). **La " Flagellose " ou " Leptomoniase " des Euphorbes et des Asclepiadacées.**—*Ann. Sci. Nat., Paris,* 10th Sér., Bot., iii, 1921, pp. xlii–lvii, 4 figs.

The history, geographical distribution, action and morphology of the flagellates occurring in the latex of *Euphorbia* and Asclepiadaceae are reviewed.

The suggestion is made that the flagellates of plants have possibly strayed from their normal insect hosts and, finding a good culture medium, have acquired definite characteristics.

MAGROU (J.). **A propos de la Flagellose des Euphorbes.**—*Bull. Soc. Path. Veg. France, Paris,* ix, pt. 1, January–March 1922, pp. 58–61, 1 fig.

This paper is a résumé of the preceding one.

SERRA (A.). **Lepra e** "*Demodex folliculorum.*" [Leprosy and *D. folliculorum.*]—*Pathologica, Genoa,* xiii, no. 305, 1st August 1921, pp. 361–368, 2 figs.

The results are given of an investigation of 58 cases of leprosy made in order to obtain information relating to the coexistence of *Demodex folliculorum* and this disease. They leave the question of the carriage of leprosy by *Demodex* still unsettled, but in the author's opinion further research appears to be justified.

DA MATTA (A.). **Considerações sobre a Dermatobiose (Ura ou Berne no Brasil).** [Notes on Infestation by *Dermatobia.*]—*Amazonas Medico, Manaos,* iii, no. 9, 1920, pp. 2–15, 1 plate.

This article, written in 1918, is a review of existing data relating to *Dermatobia hominis,* L. (*cyaniventris,* Macq.) and to its infestation of animals, chiefly cattle, and man. The author noticed in cattle a secondary cutaneous myiasis due to the larvae of *Cochliomyia* (*Chrysomyia*) *macellaria,* F., infesting the cavities abandoned by those of *Dermatobia.*

LUTRARIO (—). **Expériences sur la Diffusion de l'Acide cyanhydrique dans les Locaux fermés, et sur l'Action de cet Acide sur quelques Marchandises (Substances alimentaires et Tissus) et sur quelques Animaux parasites.**—*Bull. Office Internat. d'Hyg. Publique, Paris,* xiii, no. 4, April 1921, pp. 366–376.

The experiments, of which an account has already been published [*R.A.E.*, B, ix, 30], have been further developed. In a cabin of about 706 cu. ft., 100 gm. of sodium cyanide (88 per cent.), 100 cc. of sulphuric acid (density 64·2) and 200 cc. of water were used; the gas was found to be fairly uniformly distributed therein 30 minutes after its production began. The amount of hydrocyanic acid present averaged 1·37 gm. per cu. m. instead of the theoretical quantity of 2·42. Secondary reactions probably cause this loss. The gas was found in varying quantities in all substances exposed to its action shortly after exposure began. The quantity of gas thus taken up rapidly decreases with exposure to free air, and usually only a minute trace can be found after 24 hours.

Its insecticidal effect extended to a depth of 2–2½ in. in bags of wheat and flour, *Haematopinus suis* being used as a check. The larvae of *Anopheles* and *Culex* died in a few minutes, and the eggs of these mosquitos did not develop eight days after treatment. The flour beetle, *Tenebrio molitor,* died in 25 minutes in a test-tube closed with cotton wool, but not in flour, even near the surface, *i.e.*, 2 in. deep.

LUTRARIO (—). **Troisième Note sur l'Emploi de l'Acide cyanhydrique gazeux dans les Services de Prophylaxie de l'Administration sanitaire italienne.**—*Bull. Office Internat. d'Hyg. Publique, Paris,* xiii, no. 5, May 1921, pp. 494–503.

To get the best results in rat destruction, the sodium cyanide used should be at least of 90 per cent. quality, with not more than 2 per cent.

of chlorides. The sulphuric acid should be of 66° Bé., and should not contain iron salts, nitric acid, or hydrochloric acid. The best proportions are: sodium cyanide 1 gm., sulphuric acid 0·8 cc., water 3 cc. The optimum temperature for the chemical reaction lies between 65° and 70° C. [149° and 158° F.].

WAWRINSKY (—). **Note sur l'Emploi, en Suède, de l'Acide cyanhydrique dans les Services de l'Hygiène des Habitations.**—*Bull. Office Internat. d'Hyg. Publique, Paris,* xiii, no. 5, May 1921, pp. 504–506.

Since 1918 hydrocyanic acid gas fumigation has been used in over 10,000 cases in the disinfection of dwellings in Stockholm. The methods used are briefly described.

ROCA (M.). **Une Méthode pour neutraliser les Vapeurs d'Acide cyanhydrique**—*Bull. Office Internat. d'Hyg. Publique, Paris,* xiv, no. 2, February 1922, pp. 124–125.

Ventilation and aeration should not be the only means relied on to eliminate hydrocyanic acid gas after fumigation. What is required is a substance that will combine with the remains of the gas and is inoffensive in itself. Hydrocyanic acid acting on aldehydes forms compounds, which when saponified yield an ammoniacal salt that is non-poisonous. This renders the use of the poison very safe and permits of its extensive use.

LOEWY (J.). **Ueber die Möglichkeit der Ueberwinterung infizierter Malariamücken.** [The Possibility of Malaria-infected Mosquitos surviving the Winter.]—*Mediz. Klinik,* xvii, no. 16, 17th April 1921, p. 471. (Abstract in *Trop. Dis. Bull., London,* xix, no. 4, May 1922, p. 289.)

In February two infants in Belgrade in a children's asylum developed benign tertian malaria The author states that the possibility of these cases being relapses can be absolutely excluded and that no one in the asylum was infected with malaria. He therefore concludes that the infection must have been conveyed by mosquitos wintering in the warm rooms of the building and infected in the previous autumn.

VAN SACEGHEM (R.). **La Trypanosomiase au Ruanda.**—*Ann. Soc. Belge Méd. Trop., Brussels,* i, no. 3, December 1921, pp. 259–262.

Of the two pathogenic trypanosomes occurring in Ruanda, *T. cazalboui* var. *vivax* and *T. ruandae,* the conclusion reached in this paper is that the latter is identical with *T. congolense* (*pecorum*) [*R.A.E.*, B, ix, 171 ; x, 50].

SCHWETZ (J.). **Extrait du Rapport de la Mission médicale antitrypanosomique du Kwilu-Kwango, 1920-1921.**—*Ann. Soc. Belge Méd. Trop., Brussels,* i, no. 3, December 1921, pp. 339–365, 1 map.

The Kikwit territory, in the Kwango district, has a mixed forest and savannah vegetation. In the forest near Kikwit *Glossina tabaniformis* is common, but elsewhere it is more or less rare. The only other tsetse-fly hitherto noticed is *G. palpalis,* which is extremely rare in the southern part of the territory ; in the other parts it occurs nearly everywhere, but only in very small numbers. As is the case

elsewhere, the distribution of sleeping sickness does not coincide, quantitatively speaking, with that of *G. palpalis.* In the Kikwit territory, as in the entire Kwilu region, sleeping sickness is advancing from north to south.

JIMÉNEZ (R. M.). **El Paludismo en el Estado Zamora.** [Malaria in the State of Zamora, Venezuela.]—*Gaceta Med. de Caracas,* xxviii, no. 23, 15th December 1921, pp. 351–365, 10 figs.

A detailed description is given of *Anopheles* (*Cellia*) *argyritarsis,* which is the most common Anopheline in Zamora and the probable vector of malaria there. Two other species, not definitely determined, are also described.

BARRETO (A.). **Febbre amarella no nordeste brasileiro.** [Yellow Fever in North-eastern Brazil.]—*Arch. Brasileiros Med., Rio de Janeiro,* xi, no. 3, March 1921, pp. 205–244.

The mosquitos observed in the course of this investigation included *Aëdes* (*Stegomyia*) *argenteus, Culex fatigans* (*quinquefasciatus*) and *C. cingulatus.*

PINO-POU (R.). **La Fiebre Recurrente en general y particularmente en Venezuela.** [Recurrent Fever in general and particularly in Venezuela.]—*Gaceta Med. de Caracas,* xxviii, nos. 9–11, 15th & 31st May–15th June 1921, pp. 111–123, 125–137, 139–150, 11 figs., 8 charts.

The transmitter of recurrent fever in Venezuela is a species of *Ornithodorus,* believed by Bello and Loynaz Sucre to be *O. furcosus,* Neum., and by Tejera to be *O. turicata,* Dug. The author considers the tick concerned to be *O. talaje,* Guér., and he thinks that the bed-bugs, *Cimex hemiptera* (*rotundatus*) and *C. lectularius,* may also be vectors.

CURASSON (G.). **La Gale chorioptique du Boeuf au Sénégal et au Soudan.** —*Rec. Méd. Vét.,* xcviii, no. 1, 15th January 1922, pp. 14–19. (Abstract in *Trop. Vet. Bull., London,* x, no. 2, 31st May 1922, pp. 39–40.)

Mange in cattle appears after the rains—in November and December. Though it spreads rapidly over the body it readily yields to treatment. The native method comprises washing with urine that has undergone ammoniacal fermentation to clean the skin, and then using a decoction of the astringent bark of the baobab tree, tobacco leaves and indigo. Simple washing with native soap, followed by water containing cresyl, has given good results. Infested animals should be isolated.

This form of mange does not spread naturally to other kinds of domestic animals, though an experimental infection of the horse was successful.

RODINÒ (N.). **Una Epidemia de Febbre ricorrente ad Itala nella Somalia italiana.** [An Epidemic of Relapsing Fever at Itala in Italian Somaliland.]—*Giornale Med. Milit., Rome,* lxx, no. 2, 1st February 1922, pp. 90–93.

This paper describes an outbreak of relapsing fever in Italian Somaliland. About 90 per cent. of the ticks collected in the sand in native dwellings were *Ornithodorus moubata.*

Curasson (G.). **Les Insectes Piqueurs peuvent-ils transmettre la Peste bovine.**—*Rev. Gén. Méd. Vét.*, xxxi, no. 362, 15th February 1922, pp. 57–60. (Abstract in *Trop. Vet. Bull., London*, x, no. 2, 31st May 1922, pp. 49–50.)

Ixodes ricinus and a species of *Tabanus* were used in experiments made in Poland to ascertain whether blood-sucking parasites transmit rinderpest.

An engorged tick was removed on the second day of fever and ground up in salt solution. The liquid injected into a healthy animal produced a normal attack of the disease, but that obtained from an engorged tick ground up an hour after removal failed to infect healthy animals in three instances.

It would appear that a tick cannot carry the virus over to the next stage, but a tick that had dropped off a diseased animal before it is completely engorged might carry the infection to another one close at hand. The saliva of the tick was found not to be immediately fatal to the virus.

Negative results attended all experiments with Tabanids.

As conditions with regard to isolation during the experiments were not above suspicion, no great importance is attached to the positive results obtained.

Gabrielides (A.) & Guiart (J.). **La Myose oculaire à** "*Oestrus ovis*" **à Constantinople.**—*Bull. Acad. Méd., Paris*, lxxxvii, no. 9, 28th February 1922, pp. 253–255.

A case is quoted in which 14 first-instar larvae of *Oestrus ovis* were extracted from the eye of a shepherd.

de Beaurepaire Aragão (H.). **Transmissão da Leishmaniose no Brazil pelo** *Phlebotomus intermedius*. [The Transmission of Leishmaniasis in Brazil by *P. intermedius*.]—*Brazil-Medico, Rio de Janeiro*, xxxvi (vol. 1), no. 11, 18th March 1922, pp. 129–130, 1 fig.

In 1921 a centre of leishmaniasis developed in Rio de Janeiro in a damp and wooded locality, where *Phlebotomus intermedius*, Lutz & Neiva, occurs in large numbers. Other insects present were *Aëdes* (*Culex*) *confirmatus*, *A. taeniorhynchus* and other mosquitos; a Simuliid, *Simulium pertinax*; and a Tabanid, *Erephopsis flavicornis*. No ticks were noticed.

In experiments on the transmission of leishmaniasis by *P. intermedius*, flagellates resembling culture forms of *Leishmania* were found in this midge. On 28th October 1921 a dog was inoculated with the emulsion from five individuals fed upon a case three days previously. A small nodule developed in which scanty but typical *Leishmania* were found on 10th February.

Hylkema (B.). **De Rattenvlootheorie en de Pest in Europa.** [The Rat-flea Theory and Plague in Europe.]—*Nederl. Tijdschr. v. Geneesk.*, lxvi, pt. 1, no. 4, 1922, pp. 375–392. (Abstract in *Trop. Dis. Bull., London*, xix, no. 5, June 1922, pp. 373–374.)

The author considers that, under European conditions, the human flea [*Pulex irritans*] probably plays an important part in spreading plague, and that the connection between rat plague and human plague is not by any means an immediate one.

The curve of rat plague preceding that of human plague in Bombay has been obtained by comparing the number of dead rats found with the number of rats caught in traps, etc., these being figures that are dependent upon different factors. If, however, the percentage of plague rats among the total caught is marked in the curve, the lines of rat plague and human plague show a striking parallelism, suggesting that the disease in both species may be brought about by the same factor. This factor is the rat-flea, transferred over long distances by goods and in the vicinity by its own mobility. In the flea the plague virus may remain active for a long time, and this is not possible either in man or rats. This persistence in the flea may account for the seasonal recurrence of plague epidemics in Bombay and, formerly, in Europe.

The connection between rat plague and human plague in Europe has remained uncertain in recent epidemics. On the other hand, the probable transfer of human plague by persons watching the corpses of plague victims has been observed, fleas being very common in the class affected. In natives of the tropics, with their scanty clothing and greater bodily cleanliness, human fleas are rare. It is considered that views on the mode of spread of plague in Europe have been too largely influenced by experience in the tropics.

Reichenow (E.). **Intracelluläre Symbionten bei blutsaugenden Milben und Egeln.** [The Intracellular Symbionts of Blood-sucking Mites and Leeches.]—*Arch. f. Protistenk., Jena,* xlv, no. 1, 29th April 1922, pp. 95–116, 8 figs.

The intracellular fungi of mites and leeches are described. In the author's opinion these may have some effect on the blood of the vertebrate on which their host has fed.

Kuhn (P.). **Untersuchungen über die Fliegenplage in Deutschland.** [Investigations on the Fly Pest in Germany.]—*Centralbl. Bakt., Paras., Infektionskr., Jena,* Ite Abt., Orig., lxxxviii, no. 3, 22nd May 1922, pp. 186–204.

A thorough investigation of the occurrence indoors of *Musca domestica*, L., and *Stomoxys calcitrans*, L., undertaken in Alsace and Baden, is described.

From June 1915 to May 1917, 532 dwelling-rooms and stables were provided with fly-papers; the number of these was 49,426, and they captured 4,359,658 *M. domestica* and 282,202 *S. calcitrans*.

M. domestica is about as numerous in dwellings as in pig-sties. In the aggregate, stables and cow-sheds each contained twice as many *M. domestica* as dwellings. In Strasburg, *M. domestica* was more abundant in cow-sheds than in stables, but elsewhere the opposite was the case. The figures outside Strasburg indicate that *M. domestica* is chiefly found in stables. The relatively lower figures for this town probably depend on the more thorough removal of horse manure as compared with elsewhere.

S. calcitrans prefers cow-sheds. According to Wilhelmi, its eggs are mainly laid in cow-dung. It may also, like mosquitos, prefer the blood of cattle. It occurs in dwellings within a radius of about 200 yards of sheds or places where cattle occur.

The data obtained from the fly-papers indicate that *M. domestica* nearly always predominates over *S. calcitrans* in dwellings, the season being immaterial.

Wilhelmi has stated that nearly all adults of *S. calcitrans* die in winter, so that larvae and pupae are the hibernating forms, whilst many adults of *M. domestica* survive. The numbers of *S. calcitrans* noted in the winter of 1916 and in the first half of 1917, however, militate against an unrestricted acceptance of this view.

M. domestica assumes an importance as a pest from April and May to September and October, with its maximum in August. *S. calcitrans* occurs from June and July to November and December and reaches its maximum in September. This difference is important in connection with investigations on the transmission of disease by flies. Apart from unknown causes, it is probably due to unequal length of development, if statements in the literature, especially by English workers, are correct. Bodo von Bodemeyer has, however, observed no difference in the time of development at 17–20° C. [62·6–68° F.]. A low air temperature seems to check the development of *S. calcitrans* more than that of *M. domestica*. This and the effect of light, food, moisture and fermentation of manure still need investigation. The effect of fermentation especially requires research, the data given by Hewitt in 1908 and Roubaud [*R.A.E.*, B, iii, 197] being contradictory.

It is remarkable that *M. domestica* decreases in September, whereas *S. calcitrans*, though it seems more sensitive to cold, increases at that time. The effect of *Empusa muscae* in killing off the former may be an explanation of this.

Caullery (M.). **Le Parasitisme et la Symbiose.**—*Paris*, Gaston Doin, 1922, 16mo, 400 pp., 53 figs. Price 14 francs, cloth.

The matter dealt with in this volume formed the subject of the author's lectures at the Sorbonne in 1919–20.

Parasitism, from the point of view of general biology, is one of the most significant manifestations of evolution, and has given rise to definite types of organisms deeply modified by their specialised conditions of life. It is not a condition that can be strictly defined, being connected by an imperceptible transition with a looser association, commensalism, on the one hand, and a closer one, symbiosis, on the other.

These general problems are discussed with the aid of concrete examples, preferably such as have been the subject of recent research. While more attention is devoted to parasitism in animals in its widest sense, the main facts relating to this phenomenon in the vegetable kingdom are also noticed.

King (H. H.). **The Englishman's Dog in the Tropics.**—*London*, The Field Press, Ltd., [1922] f'scap 8vo, 98 pp. Price 5*s*.

This little book is full of information useful to dog owners in the Tropics.

The chapter on diseases includes notes on ticks, which carry tick fever or canine piroplasmosis, fleas, jiggers, and the larvae of certain flies. Ticks should be picked off every morning. If the dog's ears are kept well covered with vaseline, these pests will not enter them ; any found within can be killed by introducing vaseline, which clogs the breathing pores. Fleas will not be troublesome if the dog's box and blanket are kept clean. Dog soap is an effective remedy, but frequent washings are bad for the coat. The jigger [*Tunga penetrans*]

is dealt with by removal, the resultant cavity being washed with a disinfectant. This treatment also applies to fly larvae, of which that of *Cordylobia anthropophaga* is the form most common in dogs in Africa.

GREIG (D. M.). **Myiasis oestrosa : Being the Occurrence in the Human Subject of the Larva of** *Hypoderma bovis.—Edinburgh Med. Jl.*, N.S., xxviii, no. 6, June 1922, pp. 258–266.

The title of this article, compiled from papers to which full reference is given, indicates its contents.

BISHOPP (F. C.), MITCHELL (J. D.) & PARMAN (D. C.). **Screw-worms and other Maggots affecting Animals.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 857, December 1919, revised January 1922, 19 pp., 7 figs. [Received 7th June 1922.]

Most of this information has already been noticed [*R.A.E.*, B, vi, 121], the species dealt with being *Cochliomyia* (*Chrysomyia*) *macellaria*, F. (screw-worm fly), *Phormia regina*, Meig., *Lucilia sericata*, Meig., *Sarcophaga texana*, Aldr., *S. tuberosa* var. *sarracenioides*, Aldr., and *S. robusta*, Aldr.

For *C. macellaria*, which is the most important of these, commercial dried egg yolk, 3 oz. to each quart of water with the addition of one teaspoonful of baking soda, has proved a useful bait. This material is very attractive after decomposition has set in and will remain so for over a week. It also has the advantage of being pleasant and easy to handle.

GLASER (R. W.). *Herpetomonas muscae-domesticae*, **its Behaviour and Effect in Laboratory Animals.**—*Jl. Parasit., Urbana*, viii, no. 3, March 1922, pp. 99–108, 1 plate. [Received 7th June 1922.]

During the summer of 1921 house-flies were frequently found feeding at the punctures made by *Stomoxys calcitrans* and *Lyperosia irritans* (*Haematobia serrata*) on cattle. One of three species of flagellates found in the digestive tract of *Musca domestica* during these observations was *Herpetomomas muscae-domesticae*. The percentage of flies found infected in New Jersey corresponds closely with that recorded in warmer climates.

The morphological characters of this flagellate are discussed. Although the form under consideration appears to be morphologically identical with the European one, it is possibly a geographical variety or a distinct species, as experiments in inoculating laboratory animals with the intestinal contents of heavily parasitised flies all gave negative results. Herpetomonads from different parts of the world should be carefully compared, and a study made of the seasonal forms occurring in one region.

The Orthoptera, *Melanoplus femur-rubrum* and *Amblycorypha oblongifolia*, were used for obtaining pure cultures of the flagellates free from the bacterial infections present in the intestinal contents of flies. Of a large series of grasshoppers (*M. femur-rubrum*) inoculated, a few survived and freed themselves from the intestinal bacteria in about 48 hours, while maintaining *H. muscae-domesticae*. This also happened in the case of the only two Tettigoniids (*A. oblongifolia*) inoculated.

A satisfactory medium for the culture of the flagellated forms obtained was made of the filtered juices of the larvae of *Ephestia kühniella* combined with horse serum, the process being described.

Knight (H. H.). **Observations on the Poisonous Nature of the White-marked Tussock-moth** (*Hemerocampa leucostigma* **Smith & Abbot**). —*Jl. Parasit., Urbana,* viii, no. 3, March 1922, pp. 133–135. [Received 7th June 1922.]

Some recent experiences indicating the poisonous nature of the larvae of *Hemerocampa leucostigma*, S. & A., are described, and previous records are reviewed. The irritation is caused by the poisonous hairs located in the prominent tufts on the dorsal surface of the caterpillar, which apparently become hooked in the pores of the skin, from which they are very difficult to remove. The cocoons are also interwoven with these hairs. Purslane (*Portulaca oleracea*) has proved an efficient palliative, the leaves being mashed into a mucilaginous pulp and applied to the areas of skin affected.

Glaser (R. W.). **A Study of** *Trypanosoma americanum*.—*Jl. Parasit., Urbana,* viii, no. 3, March 1922, pp. 136–144, 4 plates. [Received 7th June 1922.]

Trypanosoma americanum is specific to cattle. Prolonged culture and environmental alterations have a tendency to produce herpetomonad types but never trypanosome types. The view is supported that it is an intermediate evolutionary stage between a true *Crithidia* and a true trypanosome. *Stomoxys calcitrans*, *Lyperosia irritans* (*Haematobia serrata*) and *Musca domestica* have been studied as likely transmitting agents ; though the results were negative, they should not be considered as conclusive. From experiments made to determine the length of time *T. americanum* could survive in these flies, it is evident that *Stomoxys* and *Lyperosia* might act as transmitters though the transfer from host to host must occur within 48 hours. The natural mode of transmission still remains problematical.

Carpenter (G. H.), Phibbs (G.) & Slattery (T.). **The Warble Flies. Sixth Report on Experiments and Observations as to Life History and Treatment.**—*Jl. Dept. Agric. & Tech. Instr. for Ireland, Dublin,* xxii, no. 1, May 1922, pp. 14–25.

This report is largely supplementary to the fourth of the series [*R.A.E.*, B, iii, 22–24]. Further experiments have confirmed the suggestion that animals under natural conditions, by licking their skin, dislodge and destroy the eggs of warble-flies rather than facilitate the entrance of the parasites into their bodies. Muzzling experiments have deepened the conviction that the parasite does not enter by the host's mouth. Incubated larvae placed on the skin of animals bored under the hide, but no fully developed warbles were recovered. Adults of *Hypoderma bovis* were then allowed to oviposit on selected areas of calves' bodies. One fly was seen to strike a calf 187 times, and presumably an egg was laid each time. The animals were kept muzzled for a week afterwards, so that there was no possibility of their licking off the eggs or young maggots, which evidently bored through the skin of the leg at or below the hock. The maggots so hatched attained their final stage by the succeeding spring. These experiments gave clear proof of the extensive migration of the larvae in hosts under observation

and control, and it is conclusively shown that larvae that bore in at the hock reach the back and become mature there. It has, however, been impossible to trace the course of migration through the skin to the wall of the gullet, where the maggots in the second stage are found embedded in the submucous coat from October to February; evidence tends to show that the maggot works through the tissues not far beneath the skin until it reaches the neck, when it goes deeper and penetrates the gullet wall from outside. The pupal period varied from 46 to 32 days, becoming appreciably shorter as the season advanced. Five larval stages are mentioned [*cf.* *R.A.E.*, B, ix, 171; x, 135].

Many attempts have been made to find some ointment or wash that would be fatal to the maggots on contact and yet harmless to cattle. In the earlier report various nicotine dressings are mentioned that killed 20 to 60 per cent. of the maggots, but in some cases injured the skin. A dressing containing 1 per cent. nicotine proved highly effective, but was very injurious and had to be discarded. The most promising dressing is made of Corry's tobacco powder and lime-wash, by mixing 1 lb. of fresh quick-lime with a gallon of water and steeping 3–4 lb. of tobacco powder in the lime-water for 24 hours and then straining through coarse muslin. The liquid should be applied with a cloth or brush to the backs of cattle; it must come into actual contact with the maggots, and the treatment should be repeated at least four times from February to the end of May. Nicotine (0·5 per cent.) in pure solution proved less effective than in the above mixture. The injection of various substances into warbles in the backs of cattle was tried and killed a fairly high percentage, as the injection brings the fluid into direct contact with the insect. Salt and glycerine (saturated) killed 68½ per cent.; tincture of iodine, 67; tannic acid (10 per cent. in alcohol) 63; and copper sulphate (7 per cent.) 61. Copper sulphate solution of the same strength as injected was used as a wash and killed only 15 to 30 per cent., and iodine tincture rubbed on killed 32 per cent. The objection to the general use of injections is their difficulty in ordinary farm practice. Sulphur-dioxide gas applied under pressure to each warble has previously been found to kill 93 per cent. of the maggots. No other application approaches this method in its effects, but the difficulties of applying it on a large scale seem to preclude its use. This and other gases liberated under impermeable covers spread over the animals' backs gave much poorer results, the best being 66½ per cent. killed by chlorine.

Further trials have been made with preventive dressings, but none gives any promise of success. Corry's "Fly Lotion" gave a slight relative protection to calves when used on the legs; birch-tar dressings also had some effect, but the stiff and sticky nature of this substance renders its use very difficult and unpleasant. Injections with arrhenal seemed to have no effect.

LOUGHNAN (W. F. M.). **Notes on a Case of Myiasis.**—*Jl. R.A.M.C., London,* xxxviii, no. 6, June 1922, p. 458.

A case of myiasis due to the larvae of *Dermatobia hominis*, L. (*cyaniventris*, Macq.) is recorded from British Honduras. The lesions occurred immediately behind the external ankle bone of either foot.

Although the eggs have been stated to be laid direct on the skin of man and domestic animals, it is probable that they are normally laid in membrane-like cases on damp leaves. The membrane is

softened by moisture and adheres to the thorax of a mosquito (*Janthinosoma*), being thus transferred to the integument of man and animals.

Boyd (J. E. M.). **On the Incidence of Mites on Mosquitos.**—*Jl. R.A.M.C., London,* xxxviii, no. 6, June 1922, pp. 459–460.

Anopheles maculipennis has been found infested with a species of Hydrachnid (water mite), which was not present on *A. bifurcatus*, *Culex pipiens* or *Theobaldia annulata*. The incidence of the mites is evidently seasonal, the largest number occurring during September.

Miller (D.). **Sheep Maggot-fly Control by Insect Parasites. The Introduction of** *Nasonia brevicornis*.—*N. Z. Jl. Agric., Wellington,* xxiv, no. 4, 20th April 1922, pp. 211–212, 3 figs.

A large consignment of *Nasonia brevicornis*, the parasite of sheep maggot-flies, has been introduced into New Zealand for the purpose of reducing the numbers of blow-flies, of which the chief are *Pollenia stygia* and *Lucilia sericata*, and, in somewhat less numbers, *Calliphora erythrocephala*, *Chrysomyia* (*Pycnosoma*) *rufifacies* and *Musca domestica*. An account is given of the life-history and habits of *N. brevicornis*, taken from the work of previous authors [*R.A.E.*, B, iii, 15; vii, 100, etc.].

Hearle (E.). **Some Mosquito Problems of British Columbia.**—*51st Ann. Rept. Ent. Soc. Ontario, 1920, Toronto,* 1921, pp. 66–70. [Received 15th June 1922.]

A list is given of the mosquitos occurring in the Lower Fraser Valley, with brief notes on their habits [*R.A.E.*, B, x, 127].

Haring (C. M.). **Entomology and Parasitology.**—*Univ. Cal., Rept. Coll. Agric. & Agric. Expt. Sta., 1920–21, Berkeley,* 1922, pp. 97–99.

A brief account is given of the results of mosquito investigations of Herms and Freeborn in 1920 [*R.A.E.*, B, ix, 66].

Observations indicate that the females of *Anopheles quadrimaculatus occidentalis* hibernate approximately from mid-November to mid-February; no males are found during this time. The importance of late autumn anti-mosquito measures is therefore evident. Owing to the activities of local workers under the Mosquito Abatement Districts Act of 1915 malaria has been reduced to a negligible factor in at least one district. Mosquito surveys have been held, and the data tabulated.

An investigation into the abundance of flies in and about poultry farms has resulted in the installation of fly-tight bins and the periodic collection of manure and garbage.

Frey (R.). **Provisorisk Förteckning över Finlands Culicider.** [A Provisional List of the Culicidae of Finland.]—*Medd. Soc. Fauna et Flora Fennica, Helsingfors,* xlvii (1920–21), 1921, pp. 98–102.

Anopheles maculipennis, Mg., is the only Anopheline in this list of 22 species.

The Culicines comprise *Culex pipiens*, L., *Theobaldia glaphyroptera*, Schin. (*bergrothi*, Edw.), *T. morsitans*, Theo., *Aëdes* (*Ochlerotatus*) *vexans*, Meig., *A.* (*O.*) *maculatus*, Meig., *A.* (*O.*) *excrucians*, Wlk.,

A. (*O.*) *freyi*, Edw., *A.* (*O.*) *lutescens*, F., *A.* (*O.*) *caspius*, Pall., *A.* (*O.*) *dorsalis*, Meig., ?*A.* (*O.*) *alpinus*, L., *A.* (*O.*) *cataphylla*, Dyar, *A.* (*O.*) *diantaeus*, H.D. & K., *A.* (*O.*) *communis*, DeG., *A.* (*O.*) *parvulus*, Edw., *A.* (*O.*) *punctor*, Kirby, and *A. cinereus*, Meig.

Frey (R.). **Ur Fågelbon kläckta Diptera.** [Diptera from Birds' Nests.] —*Medd. Soc. Fauna et Flora Fennica, Helsingfors*, xlvii (1920–21), 1921, pp. 102–103.

The following flies were bred from the remains of nests of the starling (*Sturnus vulgaris*): *Carnus hemapterus*, Nitzsch, *Meoneura* sp., *Mycetaulus bipunctatus*, Fall., and a Helomyzid representative of a new genus.

Sergent (Ed.), Sergent (Et.), Parrot (L.) & Donatien (A.). **La Prophylaxie du Paludisme en Corse.**—*Arch. Inst. Pasteur Afr. Nord, Algiers*, ii, no. 1, March 1922, pp. 1–51, 5 charts.

The information contained in the first part of this paper has been noticed from another source [*R.A.E.*, B, x, 71]. The second part deals with prophylactic measures. It is pointed out that drainage and other measures on a large scale against mosquito larvae are useless unless they can be maintained in a state of complete efficiency. Minor anti-larval measures can only be effective in restricted areas, while protection against adults by screening cannot be generally practised. The systematic use of quinine is therefore recommended, and the organisation of this service is discussed.

Sergent (Et.). **Observations sur la Biologie d'un Cératopogoniné Piqueur et Suçeur de Sang: *Holoconops mediterraneus*, J. J. Kieffer 1921.**—*Arch. Inst. Pasteur Afr. Nord, Algiers*, ii, no. 1, March 1922, pp. 119–120.

Further information on the biting habits of *Holoconops mediterraneus* is recorded [*R.A.E.*, B, x, 50]. This midge is very seldom found in habitations, but bites freely in sheltered places under trees or on stormy days under a cloudy sky, attacking any exposed part of the human body. The bite is sometimes as painful as that caused by *Culex*. The insect is generally fully gorged after one blood meal.

Sergent (Ed.). **Rapport sur le Fonctionnement de l'Institut Pasteur d'Algérie en 1921. Sommaire.**—*Arch. Inst. Pasteur Afr. Nord, Algiers*, ii, no. 1, March 1922, pp. 121–141.

This summary gives a brief review of the work of the Pasteur Institute of Algeria for 1921.

E.L. **Construction et Emploi d'une Baignoire pour Bétail (Dipping Tank).**—*Bull. Agric. Congo Belge, Brussels*, xiii, no. 1, March 1922, pp. 220–231, 4 figs.

Plans and detailed descriptions are given of a cattle dipping tank for the control of ticks, the rôle of which in the dissemination of disease is briefly discussed.

HEARLE (E.). **An Aerial Survey of Mosquito Breeding Places.**—*Agric. Gaz. Canada, Ottawa*, ix, no. 3, May–June 1922, pp. 191–195, 2 figs.

Owing to the use of aeroplanes during 1921 by the Canadian Air Board, in co-operation with the Entomological Branch, in the Lower Fraser Valley of British Columbia, it has been possible to obtain a series of photographs, accompanied by careful notes, covering every breeding-place of mosquitos and giving sufficient data for the preparation of a map indicating those areas upon the reclamation of which their control depends. It is estimated that there are in the valley some 28,000 acres of temporary flood-water breeding areas suitable for the production of vast numbers of *Aëdes aldrichi* and *A. vexans*.

MACFIE (J. W. S.). **Accra Laboratory Report for the Year 1920.**—*Govt. Gold Coast, Rept. Med. Dept. 1920, Accra*, 1921, pp. 39–64.

Examinations of mosquito larvae showed that, as usual, *Aëdes argenteus*, Poir., was the commonest species, being found in 91·4 per cent. of the samples. *Anopheles costalis*, Theo., the only known malaria carrier in the list, was encountered only once.

During a few months, commencing at the end of November 1919, of 607 mosquitos collected in houses and offices in Accra, *A. costalis* represented 14 per cent. and *Aëdes argenteus* 15·8. *Culex fatigans*, Wied., predominated (63·9). The other species collected were *C. thalassius*, Theo., *C. decens*, Theo., *C. tritaeniorhynchus*, Giles, *Culiciomyia nebulosa*, Theo., *Mansonioides africanus*, Theo., *Banksinella lineatopennis*, Ludl., *Aëdes* (*Ochlerotatus*) *irritans*, Theo., *A.* (*O.*) *minutus*, Theo., and *A.* (*O.*) *punctothoracis*, Theo.

Banksinella lineatopennis, *Culex perfidiosus*, Edw., and *C. rima*, Theo., were added to the mosquitos indigenous to Accra; and *C. perfuscus*, Edw., or a variety of that species, was also collected, so that the list now includes 62 species or well-recognised varieties. A new *Aëdes* of the subgenus *Stegomyia*, *A.* (*S.*) *dendrophilus*, Edw., was reared from material taken from rot holes in trees.

With regard to malarial infections in Anophelines, 432 specimens were collected indoors from May 1919 to April 1920, of which 428 were *A. costalis*, 3 *A. pharoensis*, and 1 *A. funestus*. Of the 231 specimens dissected, only one, a specimen of *A. costalis*, was found to have sporozoites in its salivary glands. This result is surprising in view of the well-known prevalence of malaria in Accra—malignant tertian is the common type, and the stage of the parasite infective to mosquitos, the crescents, is very common. It would appear that the position of Accra is an unfavourable one for the spread of the malaria parasite, and that a slight change in the conditions might turn the scale definitely against it.

A Psychodid, *Telmatoscopus meridionalis*, Eat., is an inoffensive midge that is nevertheless, in a sense, a sanitary danger signal, inasmuch as it breeds in most filthy collections of water, and thrives particularly well on faecal matter.

CLELAND (J. B.). **Insects and their Relationship to Injury and Disease in Man in Australia—No. II.**—*Australasian Med. Congress, Trans. Eleventh Session held in Brisbane, Queensland, 21st–28th August 1920*, pp. 258–265.

The following data are additional to those in a paper contributed to the Congress at Sydney in 1911.

An earwig, *Anisolabis colossea,* can draw blood and inflict a wound that may become severe through septic infection. The bulldog ant, *Myrmecia* sp., has a painful bite, and the simultaneous attack of several individuals has been known to cause death. The green tree ant, *Oecophylla smaragdina,* is also noted for its painful bite and ferocity. The caterpillars of *Euproctis edwardsi, Teara* sp. and *Trilocha* (*Ocinara*) *lewinae* are capable of causing a severe rash. The larvae of *Lucilia* have been recorded as causing myiasis.

JOHNSTON (T. H.). **Notes on certain Queensland "Bush Flies."**—*Australasian Med. Congress, Trans. Eleventh Session held in Brisbane, Queensland, 21st–28th August 1920,* pp. 265–272.

A description is given of the following Muscid flies :—*Musca convexifrons,* Thoms. (*Viviparomusca fergusoni,* J. & B.), which breeds in cow or horse dung, its original breeding nidus probably being decomposing vegetation ; *M. pumila,* Macq. (*Eumusca vetustissima,* Wlk.), perhaps the commonest fly in Australia ; *M. terrae-reginae,* J. & B., with breeding habits fairly similar to those of the house-fly ; and *M. ventrosa,* Wied. (*hilli,* J. & B.), closely resembling the preceding species.

The habits of these flies are similar. They especially infest the eyes, nose and mouth of man and animals, and readily invade any sore or abrasion.

PRICE (T. A.). **Control of Mosquito Infestation in City Areas.**—*Australasian Med. Congress, Trans. Eleventh Session held in Brisbane, Queensland, 21st–28th August 1920,* pp. 280–282.

Queensland towns, with few exceptions, are badly infested with *Culex fatigans* and *Aëdes argenteus* (*Stegomyia fasciata*), and this paper urges the need for placing anti-mosquito work in competent hands and in making it continuous. At Toowoomba the necessary legislation was passed in 1916, and oiling led to a distinct decrease of *C. fatigans* until the work was interfered with.

PURDY (J. S.). **The Control of Insect Vectors of Disease in War and Peace.**—*Australasian Med. Congress, Trans. Eleventh Session held in Brisbane, Queensland, 21st–28th August 1920,* pp. 298–306.

This is a general review of the subject. The measures recommended for fly-prevention, etc., under service conditions, are on well-known lines.

In one case it is stated that after the extermination of cockroaches in a house it was found advisable to reintroduce them to keep down bed-bugs.

SUTTON (H.). **Anti-malarial Work in Palestine.**—*Australasian Med. Congress, Trans. Eleventh Session held in Brisbane, Queensland, 21st–28th August 1920,* pp. 306–310.

The general conditions respecting malaria and mosquitos in Palestine are discussed.

The conclusion is reached that even under war conditions it is possible to minimise mosquito-breeding in one of the worst mosquito and malaria regions of the globe, and to reduce malaria to reasonable limits.

Ferguson (E. W.). **Malaria in Palestine: Experiences with a Field Laboratory.**—*Australasian Med. Congress, Trans. Eleventh Session held in Brisbane, Queensland, 21st–28th August 1920*, pp. 310–317.

Under war conditions, in 1918, benign tertian was the prevailing type of malaria in the coastal sector in summer, but the rise consequent on the advance was entirely due to malignant tertian, the reason being that the troops advanced from an area where *A. maculipennis* and *A. pharoensis* predominated into one infested by *A. palestinensis*.

Lawrence (H.). **The Pathogenicity of the** *Demodex folliculorum*.—*Australasian Med. Congress, Trans. Eleventh Session held in Brisbane, Queensland, 21st–28th August 1920*, pp. 543–544.

This subject has been dealt with in a notice of a later paper [*R.A.E.*, B, ix, 186].

Carment (A. G.). **Report on Experiment of Fly Breeding from Stable Manure with a Short Account of the Finding of a Parasite.**—*Agric. Circ. Fiji Dept. Agric., Suva*, iii, no. 1, January–March 1922, pp. 1–5.

Some years ago the extraordinary disappearance of very large numbers of house-flies [*Musca domestica*] from certain districts in Fiji was noticed. The cause of this was not discovered, but it may have been due to the presence of a parasite that has recently been observed. Examination of the top layer from a manure dump kept for use in a vegetable garden revealed the presence of a small Hymenopteron moving about inside the pupal cases of *M. domestica*. The parasite is present in the manure heap with the larval stage of *M. domestica*, but does not attack this stage, and remains fairly inactive until the manure begins to dry. It then moves about actively in search of fly pupae, which it pierces with its ovipositor, depositing its egg on the inside of the pupal case. The small larvae feed on the soft tissues of the developing fly within the pupal case until they have transformed into adults, which eat their way out of the side of the pupal case. Both sexes of the parasite were bred from fly pupae, and a larva was obtained parthenogenetically from a female enclosed with a pupa of *M. domestica*. The ease with which this parasite was reared in the laboratory indicates the possibility of its rapid spread and affords some hope of the total destruction of flies breeding from stable manure.

Experiments to test the flight of *M. domestica* by means of staining numbers of the adults showed that the flies travelled against the wind, evidently following a scent, as no flies were reported to leeward.

Dawe (M. T.). **Efwatakala Grass** (*Melinis minutiflora*) **as a Means for the Control of the Tsetse-fly.**—*Tropical Life, London*, xviii, no. 5, May 1922, pp. 69–71, 1 fig.

The author suggests that the grass, *Melinis minutiflora* (known as Efwatakala in the Congo, where it grows abundantly) might be employed with advantage in certain parts of Africa, and perhaps in other countries also, as a means of controlling tsetse-fly [*Glossina*], ticks and possibly mosquitos. The plant has a wide distribution in Africa, extending from the south of the Sahara to Natal, and occurring also in Madagascar. Other species in Angola are *M. gracilis*, *M. effusa*, and an unidentified species. The grass has a strong odour which may serve as a repellent, while the leaves are covered with glandular hairs which contain a viscid oil, which is believed to be objectionable

to certain insects. *M. minutiflora* covers the ground so thickly that the flies would find no bushes to alight on, nor would they be able to reach the ground through the dense growth, and might thus be driven from areas planted with the grass. In the Portuguese Congo the grass is used as bedding for poultry and animals, because of the belief in its insecticidal properties. It is said not to be burnt by grass fires. It is much used in South America as pasture for cattle, and it is believed that ticks cannot live in it. It is even said that cattle when fed on the grass and then moved to tick-infested pastures are not attacked by the parasites for some time. It is believed in Colombia that the fly producing warbles in cattle in South America (*Dermatobia hominis*) is disappearing before the extending cultivation of this grass, which grows easily on either moist or dry land and spreads very rapidly.

The possibilities of converting fly-infested areas into profitable grazing lands for cattle are discussed. In such areas trees and bush, where flies shelter, should be cleared away, and the land planted first with maize, beans, ground-nuts or cotton, and after re-clearing the grass seed should be sown. The opinion is expressed that the crops gathered should pay for the initial cost of clearing the land and planting the grass. The project would have to be carried out on a large scale to be effective, and would require Government support.

Pierce (W. D.). **Some Milk Goat Problems observed in California.**—*Cal. State Dept. Agric., Sacramento*, Spec. Pubn. 22, 15th May 1922, 13 pp.

These notes on the parasites of goats are based on personal observation in the San Mateo County during 1921, and do not claim to be exhaustive for the State of California.

The larvae of *Oestrus ovis*, L., are deposited in the nostrils of sheep and goats, whence they reach the frontal sinuses. In the case of goats death frequently results from infestation. The nostrils of these animals should be protected by the application of pine tar and eucalyptus oil in the proportions of 1 pint to 1 oz. This may be brushed on the nose of each animal as it leaves the pen or applied to the boards above the feeding rack.

The louse, *Linognathus stenopsis*, Burm., is particularly injurious to kids, and is thought to cause material reduction in the numbers reared to maturity; it may be controlled by dusting with sodium fluoride powder. *Trichodectes climax*, Nitzsch, is found on all parts of the body of the animals; it retards the growth of the kids and injures the condition of the flesh. This louse produces loss in weight and milk production. The standard arsenical dip may be used against it, but for goats should be made as follows: 4–5 lb. dry, granulated caustic soda, at least 85 per cent. pure, 10 lb. white arsenic in fine powder, 99 per cent. pure, and 10 lb. sal soda crystals, all mixed into 1 U.S. gal. water kept just below boiling point, to which 5 U.S. gals. are added, making a stock solution For use this must be diluted at the rate of 1 part to 124 of water with the addition of ½ part pine tar.

About 50 per cent. of the goats were found to be infested with ear mites, *Psoroptes communis* var. *ovis*, Hering, for which an ointment made of sulphur flowers and sweet oil should be used.

The various flies associated with herds of goats are *Musca domestica*, L., *Stomoxys calcitrans*, L., *Cochliomyia* (*Chrysomyia*) *macellaria*, L. (screw-worm fly), *Phormia regina*, Meig., *Lucilia sericata*, Meig., and *Calliphora coloradensis*, Hough. It is essential that milk should be protected from these flies.

Brèthes (J.). **Los Tabánidos del Plata.** [The Tabanidae of the River Plate Region.]—*Buenos Aires*, 1921, 79 pp., 1 fig. [Received 20th June 1922.]

The author has collected in this paper the scattered descriptions of Tabanids hitherto recorded from the River Plate region. South America, which has only been superficially explored, contains roughly one third of the (approximately) 1,600 species and 40 genera of this family. A table is given showing the world distribution of the various genera. This is followed by notes on the distribution in Argentina of some of the 108 species found there and by keys to the 18 Argentine genera, and to the species of several of them.

The new species described are :—*Pangonia* (*Pangonius*) *dichroa, Erephopsis picea, E. opaca, E. submetallica, Esenbeckia tucumana, Silvestriellus* (gen. n.) *patagonicus, Chrysops bonariensis, C. lynchi, C. paraguayensis, Haematopota* (*Chrysozona*) *argentina, Pseudoselasoma* (gen. n.) *opacum, P. nitidum, Dichelacera plagiata, Tabanus distinctus, T. subantarcticus, T. albibasis, T. bruchi, T. palpalis, T. ameghinoi, T. acer, T. melanogaster, T. confirmatus, T. princeps, T. arvensis, T. bellicosus, T. ornatissimus, T. melanopterus, T. sylvestris, T. corpulentus, T. platensis, T. signativentris, T. seclusus, T. habilis, T. erynnis* and *T. antilope.*

As regards disease transmission, it is stated that Dr. F. Rosenbusch strongly suspects that mal de caderas may be carried by a Tabanid.

Franchini (G.). **Sur un Amibe des Figuiers de plein Air de la Région parisienne et sa Culture.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 5, 10th May 1922, pp. 287–292, 3 figs.

The latex of *Ficus carica* growing at Paris harbours an *Amoeba*, which has a flagellate stage and which appears to resist very low temperatures. It can be cultivated on a Nöller plate, and there consumes the red corpuscles, thus behaving like the pathogenic *Amoeba* of the human intestine.

Lagrange (E.). **Contribution à l'Etude des Piroplasmes des Bovidés.** —*Bull. Soc. Path. Exot., Paris*, xv, no. 5, 10th May 1922, pp. 295–299.

Experiments were made as to whether the various parasites found in bovine piroplasmosis in Annam can be transmitted from one species of animal to another, whether deer can be a reservoir of the virus, and whether ticks can convey the parasite from one species to another.

The author succeeded in inoculating a calf with *Gonderia* (*Theileria*) *mutans* from a buffalo. Blood from a captive specimen of *Cervus aristotelis* and from a dead wild example failed to reveal *Theileria*. This deer blood proved fatal to a calf and a goat injected with it, probably because the plasma of deer is toxic to bovines.

Piroplasma bigeminum and *Anaplasma marginale*, both parasites in cattle, do not seem capable of transmission to the buffalo.

As regards *Piroplasma bubali*, negative results attended the inoculation of a calf with buffalo blood.

The oxen in Annam are abundantly and exclusively infested by a tick, *Boophilus decoloratus*. Ticks do not appear to occur on the buffalo, so that the transmission of *Theileria* by ticks is doubtful, at least in Annam, where this organism is as common in buffalo as in oxen. Another tick, *Haemaphysalis* sp., is very abundant on wild deer.

Franchini (G.). **Nouvelles Recherches sur les Trypanosomes des Euphorbes et sur leur Culture.**—*Bull. Soc. Path. Exot., Paris,* xv, no. 5, 10th May 1922, pp. 299–303, 1 fig.

The culture of trypanosomes from *Euphorbia* has been made successfully on plates of Nöller medium. Examination of the cultures showed a close relation between these trypanosomes and other large parasites, round or ovular in shape and resembling *Amoeba,* found with them. There is probably an endocellular stage in the development of the trypanosome.

Brug (S. L.) & de Rook (H.). *Bironella gracilis* **Theobald 1905.**—*Bull. Soc. Path. Exot., Paris,* xv, no. 5, 10th May 1922, pp. 305–310, 12 figs.

Descriptions of both sexes and of the larva of *Bironella gracilis,* Theo., are given, from specimens taken in the north of New Guinea. The breeding-places were in the virgin forest and comprised pools of swamp water with a muddy bottom. The larvae were easily captured, as they are not active. Though the distance to the forest was small, no specimen of this Anopheline was taken in the huts forming the camp, where, on the other hand, *Anopheles punctulatus* var. *moluccensis,* Sw., was abundant. *B. gracilis* does not appear to have been a carrier of malaria in the camp.

Kerrest (J.), Gambier (A.) & Bouron (A.). **La Fièvre récurrente du Soudan.**—*Bull. Soc. Path. Exot., Paris,* xv, no. 5, 10th May 1922, pp. 320–331, 1 map.

An outbreak of recurrent fever that began in May 1921 in the French Sudan is described. An examination of 3,735 of the inhabitants of 13 villages on the Niger failed to reveal the spirochaete, nor was *Ornithodorus moubata* found. The disease was imported by native troops from Syria or Morocco, and its spread is easily accounted for by lice, *Pediculus humanus* (*vestimenti*), found in the clothing of nearly all the natives. The measures taken included the establishment of disinfection and isolation stations.

Galli-Valerio (B.). **Parasitologische Untersuchungen und Beiträge zur parasitologischen Technik.** [Parasitological Researches and Technique.] — *Centralbl. Bakt., Paras., Infektionskr., Jena,* IIte Abt., lvi, no. 14–16, 20th June 1922, pp. 344–347.

In November 1921 very few flagellates were found in examples of the bug, *Pyrrhocoris apterus,* which were infected with *Herpetomonas pyrrhocoris.* The gut contained spherical cysts with either granular protoplasm or spindle-shaped sporozoites. Some of the latter were free and were noticed, in one case, in the oesophagus. The author suggests that *H. pyrrhocoris* derives from forms found by him in *Colchicum autumnale,* and that these cysts are the agents diffusing the parasite in plants.

Attempts were made to infect vertebrates, such as fish, frogs, mice and rats, with *H. pyrrhocoris,* but no flagellates resulted ; in a few cases leishmaniform bodies occurred at the inoculation point. Inoculations with *H. melophagi* gave similar results. The matter is of great interest in connection with the hypothesis that these parasites are derived from Cnidosporidia of insects.

The author states that *Calliphora erythrocephala* can not only hibernate but can oviposit in winter.

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THE REVIEW OF APPLIED ENTOMOLOGY

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Klein (W.). **Die Heilung der Acarusräude durch das Schwefelgasbad (Sulfargil probalneo).** [The Cure of Mange by the Sulphur Gas Bath.]—*Deutsche Tierärztl. Wochenschr., Hanover*, xxx, no. 25, 24th June 1922, pp. 325–326.

From observations on sheep the author believes that mange cannot become established unless the skin is in a receptive condition, predisposed by a skin catarrh. Mites often occur in the sebaceous glands of man and in the eyelids of sheep, cattle, and pigs without a general infestation. The host tissues attempt to combat mange by an inflammation, and this should be assisted by increasing the counter irritation. Sulfargil is recommended as suitable for this purpose, and the author's method of using this preparation is described.

Arias G (J. M.). **La Plaga de las Garrapatas.** [The Pest of Ticks.]—*Minist. Agric., Guatemala*, Bol. popular, N.S., no. 15, June 1922, 25 pp., 3 figs.

This is a popular bulletin on ticks and the diseases transmitted by them.

Defiel (F.). **An Experimental Investigation of the supposed Poisonous Qualities of the Granary Weevil,** *Calendra granaria.*—*Amer. Jl. Trop. Med., Baltimore*, ii, no. 3, May 1922, pp. 199–211.

In view of the widespread belief that the granary weevil, *Calandra* (*Calendra*) *granaria*, can be used as an efficient substitute for the ordinary blister beetle, *Lytta* (*Cantharis*) *vesicatoria*, and also owing to many current opinions concerning the poisonous nature of this weevil, the literature concerning the insect from these aspects is reviewed, and many experiments to test their truth are described. From the results it may be concluded that the granary weevil contains no cantharidin and cannot be used as a substitute for the blister beetle, nor is there any evidence to indicate that it is responsible for cases of poisonous flour.

St. John (J. H.) & Bates (L. B.). **The Relapsing Fever Spirochete of Panama.**—*Amer. Jl. Trop. Med., Baltimore*, ii, no. 3, May 1922, pp. 251–266.

Since the publication of a recent article demonstrating that *Ornithodorus talaje* is the transmitting agent of relapsing fever in Panama [*R.A.E.*, B, ix, 198], the authors have been conducting investigations with a view to determining the identity of the spirochaete that is the cause of the fever. By means of comparative studies it is found that the spirochaete concerned is distinct from *Spirochaeta obermeieri*, *S. novyi*, *S. kochi*, *S. duttoni* or *S. carteri*.

Piccininni (F.). **Il Contagio della Peste alla Luce di un recente Episodio di Peste in Italia.** [The Transmission of Plague in the Light of a Recent Occurrence of Plague in Italy.]—*Ann. d'Igiene, Rome*, xxxii, no. 4, April 1922, pp. 264–276.

The main points of a study of an occurrence of plague from July to September 1921 in the province of Naples are discussed. The disease was imported by rats on board plague-free steamers arriving from infected ports, and in spite of the most rigorous measures directed towards preventing the landing of rats. Most of the rats normally

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living in the zones infected with rat plague were immune. Some cases of human plague were due to infected flour and grain from mills and warehouses infected with rat plague. As regards this last point, experiments show that in artificially infected grain, the plague bacillus can retain its virulence for not more than 14 days at temperatures between 2° and 13° C. [35·6°–55·4° F.].

It follows that prophylactic measures against steamer rats cannot be relied upon, that measures against the rats ashore are very necessary in order that plague amongst them may be discovered and dealt with without delay, and that cereals must not be taken from infected warehouses until 14 days have elapsed after their thorough disinfection. Furthermore, all cereals from plague-infected localities must be the subject of special supervision.

de Buen (F.) & de Buen (S.). **Note sull' Acclimatazione della "*Gambusia affinis*."** [Notes on the Acclimatisation of *G. affinis*.] —*Ann. d'Igiene, Rome*, xxxii, no. 4, April 1922, pp. 281–285, 4 figs.

A consignment of *Gambusia affinis*, supplied by the U.S. Bureau of Fisheries, was kept for four months in the aquaria of the Spanish Institute of Oceanography. Dried cod-roe proved a suitable food, but life in captivity hindered reproduction to a considerable extent. Individuals that were placed in a pond in July 1921 (shortly after their arrival) increased at a great rate, and when the rains at the end of the winter caused the pond to overflow, the fish migrated to a neighbouring stream. At the time of writing at least three generations were present. It is intended to distribute the fish in order to study their action on mosquito larvae.

Gioseffi (M.). **La Malaria in Istria nel 1920.** [Malaria in Istria in 1920.]—*Il Policlinico*, Sez. Prat., 23rd January 1920 [*sic*]. (Abstract in *Ann. d'Igiene, Rome*, xxxii, no. 4, April 1922, pp. 307–308.)

In winter no mosquito larvae were found in swamp water. The first larvae of *Culex* and *Anopheles* appeared in April. Owing to the exceptional drought no Anophelines were observed after August. No larvae were found in a pool where fish had been placed in the previous year.

Di Pace (I.). **Salinificazione di Raccolte d'Acqua anofeligene.** [The Salinity of Water harbouring Anophelines.]—*La Malariologia*, 1921, no. 6. (Abstract in *Ann. d'Igiene, Rome*, xxxii, no. 4, April 1922, p. 311.)

Anopheline eggs do not develop in sea salt-pans, even if laid in them. Lakes, ponds and marshes close to the sea should be transformed into salt-pans, a method suggested by the author in 1906, and used with success by Fermi in Sicily.

Lustig (A.) & Franchetti (A.). [Report of the Pellagra Commission.] —*Lo Sperimentale*, 1921, p. 187. (Abstract in *Ann. d'Igiene, Rome*, xxxii, no. 4, April 1922, pp. 317–318.)

The authors do not accept Sanbon's theory that pellagra is due to a blood parasite transmitted by *Simulium*. Allessandri's observations show Simuliids to occur nearly everywhere in Italy, including places where pellagra does not exist.

Godoy (A.) & Pinto (C.). **Estudos sobre Malaria.** [Studies on Malaria.] —*A Folha Medica, Rio de Janeiro,* iii, no. 8, 30th April 1922, p. 87.

In the district of Campos, State of Rio de Janeiro, *Anopheles* (*Cellia*) *brasiliensis* is the most common Anopheline, the other species there being *A.* (*C.*) *argyritarsis*, *A.* (*C.*) *albimanus* and *A.* (*C.*) *tarsimaculatus.* Microscopic examination showed *A. brasiliensis* to be infected with malaria, though the authors are not satisfied as to the value to be attached to such examinations of the stomachs of Anophelines.

Ferris (G. F.) & Cole (F. R.). **A Contribution to the Knowledge of the Hippoboscidae (Diptera Pupipara).**—*Parasitology, Cambridge,* xiv, no. 2, June 1922, pp. 178–205, 20 figs.

Up to the present the study of Hippoboscids has been almost entirely restricted to the observation of dried specimens. The authors do not, however, consider this method adequate in the case of the Pupipara, as the abdomen, which often presents valuable characters, is generally passed over with little or no mention owing to its shrivelled condition. Ten species are therefore here redescribed, the technique employed for the preparation of slide mounts being given.

The new species, dealt with are *Lipoptena traguli*, described from male and female individuals taken from three species of *Tragulus*, from islands in the south China sea ; *Ornithoica promiscua*, from females, from various birds in California ; and the male of *Melophagus ovinus*, L., *montanus*, subsp. n., from mountain sheep, on the Alaska-Yukon boundary.

Leger (M.) & Baury (A.). **Trypanosome de l'Ecureuil fossoyeur du Sénégal,** *Xerus erythropus.*—*C.R. Soc. Biol., Paris,* lxxxvii, no. 22, 17th June 1922, pp. 133–134.

Trypanosomes have been isolated from a ground squirrel (*Xerus erythropus*) in the immediate vicinity of Dakar, Senegal, and are provisionally described as *T. xeri*, though they may prove to be identical with *T. eburneense* found on the Ivory Coast in *Mus concha.* The latter was successfully inoculated into *X. erythropus.* Experiments with the inoculation of *T. xeri* into white rats, mice and guinea-pigs proved negative.

Leger (M.). **Formes crithidiennes observées chez** *Lyperosia thirouxi*, **Roubaud.**—*C.R. Soc. Biol., Paris,* lxxxvii, no. 22, 17th June 1922, pp. 134–136.

During the examination of numerous biting flies, *Lyperosia thirouxi*, Roub., and *L. longipalpis*, Rond. (*minuta*, Bezzi) taken on animals suffering from horse-sickness at Dakar, one individual was found to harbour numerous crithidial flagellates. They occurred in the stomach, in the middle of freshly ingested red blood corpuscles that were apparently the same as those of the horse. Subsequent examinations of *L. thirouxi* and *L. minuta* taken on cattle and healthy horses proved negative.

These observations require further amplification before it can be decided whether this organism is specific to *L. thirouxi* or whether it is a trypanosome of vertebrates.

No haematozoa were found in the blood of horses either during the various stages of the illness or after death, and inoculations into laboratory animals remained negative.

SIGALAS (R.) & PIROT (R.). **Présence de** *Spirochaeta icterohaemorrhagiae* **chez les Rats de Bordeaux.**—*C. R. Soc. Biol., Paris*, lxxxvii, no. 22, 17th June 1922, pp. 195–197.

Spirochaeta icterohaemorrhagiae has been isolated from rats at Bordeaux, a detailed account being given of the observations.

STRAUSS (P.). **Comment détruire les Mouches.**—*Vie Agric. et Rur., Paris*, xx, no. 25, 24th June 1922, pp. 432–433, 10 figs.

General methods for the destruction of such flies as *Musca domestica, Lucilia caesar, Calliphora vomitoria*, and *Stomoxys calcitrans*, are described. Measures against the eggs and larvae include thorough cleanliness in stables and all animal shelters, and the spreading of manure into a thin layer so that poultry can pick out the larvae. For killing the adult flies fumigation with cresyl or sulphur, solutions of formol in open receptacles, traps and sticky papers, and pyrethrum powder as a dust or as a fumigant, the stupified flies being afterwards swept up and burnt, are recommended. To deter flies from entering dwellings the windows should be painted blue, and windows and doors should be kept closed unless they are screened. Every care should be taken to protect food from flies, not only in dwellings but also during transport and in shops.

FLORENCE (L.). **The Hog Louse,** *Haematopinus suis* **Linnê: its Biology, Anatomy, and Histology.**—*Cornell Univ. Agric. Expt. Sta., Ithaca, N.Y.*, Memoir 51, December 1921, pp. 635–743, 9 plates. [Received 30th June 1922.]

Haematopinus suis, L. (hog louse) is common everywhere on pigs. The lice infest the folds of skin on the neck and jowl, the inside and base of the ears, the inside of the legs and the flanks, and occur in smaller numbers on the back. From the time of hatching they feed readily on man, but attempts to feed them on guinea-pigs were not successful. The method of feeding is described. The number of meals required in the 24 hours varies according to the rate of digestion which is influenced by the temperature. The eggs are laid one at a time on the bristles and are attached to them by a clear cement. In captivity they are laid on bristles or threads of gauze, the number depending on the opportunity to feed. During a period of 16 days, 18 eggs were laid. Incubation varies according to temperature from 12–20 days, with a minimum of about 13–14 days when the eggs are kept constantly at body temperature. In the course of development the lice undergo three moults, the cycle from egg to egg occupying 29–33 days.

No protozoan parasites were found in any part of the alimentary canal.

KONSULOFF (S.). **Über die Doppelatmung der Mückenlarven.** [On the Double Breathing of Mosquito Larvae.]—*Biol. Zentralbl., Berlin*, xlii, no. 4, April 1922, pp. 188–192, 3 figs.

The experiments here described show that mosquito larvae are able to breathe by means of their anal appendages. The function of these as respiratory organs is, however, very limited, and only sufficient

under conditions of lowered vitality, such as when the larvae are in ice-covered water and when the temperature of the water does not exceed 4–5° C.

By this means they are able to breathe the air contained in the water.

CONNOR (M. E.). **Notes on the Use of Freshwater Fish as Consumers of Mosquito Larvae in Containers used in the House, based upon Experience in Guayaquil, Ecuador, and Merida, Yucatan, Mexico.**—*Amer. Jl. Public Health,* xii, no. 3, March 1922, pp. 193–194. (Abstract in *Sanit. Suppmts., Trop. Dis. Bull., London,* no. 2, 30th June 1922, pp. 104–105.)

This is a condensed account of the author's experiences with larvicidal fish in many campaigns against yellow fever. Points that make the use of fish effective are enumerated. Top-feeders are best for open-air fountains and collections of water of a similar nature, while bottom-feeders are best for tubs, barrels, etc., in the house. Apparently no fish will live in metal tanks; for these, tight-fitting lids must be provided.

BARNEY (R. L.) & ANSON (B. J.). **The Seasonal Abundance of the Mosquito-destroying Top-minnow,** *Gambusia affinis,* **especially in relation to Fecundity.**—*Anat. Rec.,* xxii, no. 5, 1921, pp. 317–335, 9 figs. (Abstract in *Expt. Sta. Record, Washington, D.C.,* xlvi, no. 8, June 1922, p. 750.)

This report deals with biological studies conducted by the U.S. Bureau of Fisheries in co-operation with the U.S. Bureau of Entomology during the years 1916 to 1918 and in 1920.

PARK (G. W.). *Gambusia affinis,* **the Natural Agent for Destroying Mosquito-breeding in Texas.**—*Texas State Jl. Med., Fort Worth,* xvii, no. 12, April 1922, pp. 579–581, 2 figs.

The Texas State Board of Health have found *Gambusia affinis* a valuable auxiliary in mosquito destruction. Data regarding the use of this fish are given.

HALL (M. C.). **Treatments for removing the Gastrointestinal Parasites of Horses.**—*N. Amer. Veterinarian* [*Chicago, Ill.*], ii, no. 11, 1921, pp. 512–524, 550. (Abstract in *Expt. Sta. Record, Washington, D.C.,* xlvi, no. 7, May 1922, pp. 685–686.)

A review of the literature and a report of tests made of carbon tetrachloride and mixtures of carbon tetrachloride and carbon bisulphide are given.

The results indicate that carbon bisulphide in a dose of 6 dr. to a horse that has fasted properly is a reliable treatment for the removal of bots. Oil of chenopodium is not of value for this purpose. Carbon tetrachloride is apparently more effective, relatively, against *Gastrophilus nasalis* than against *G. intestinalis,* but its efficacy against bots is less than that of carbon bisulphide. Carbon tetrachloride was ineffective in removing *Habronema* from one horse, and as this drug is less toxic than carbon bisulphide it is probable that the latter should be used in the case of these worms. The combination of carbon bisulphide and carbon tetrachloride does not appear to be particularly valuable.

Dyar (H. G.) & Ludlow (C. S.). **Notes on American Mosquitoes (Diptera, Culicidae).**—*Milit. Surgeon, Washington, D.C.*, l, no. 1, January 1922, pp. 61–64, 2 figs.

Descriptions are given of *Culex* (*Choeroporpa*) *aneles*, sp. n., from the Panama Canal Zone, and of the hitherto unknown males of *Goeldia espini*, Mart., and *Aëdes* (*Taeniorhynchus* ?) *thelcter*, Dyar.

Haydon (L. G.). **Memorandum on the Disposal of Animal Manure and Garbage in relation to Fly-breeding, and the Prevention of Enteric Fever and other Intestinal Diseases.**—*S. African Med. Record, Cape Town*, xx, no. 12, 24th June 1922, pp. 230–232.

The device here described for storing manure and garbage so as to destroy flies and rot the contents for use as a fertiliser consists of enclosures of wire mesh on cement or brick platforms. A channel sunk in the platform surrounds the enclosures and traps the larvae as they are driven out by the heat engendered in the material trodden down in the enclosure. The great secret of success is the close packing of the manure at the edges.

Belai (A.). **Beobachtungen bei einer Epidemie von Tertianafieber in russischer Kriegsgefangenschaft.** [Observations on an Epidemic of Tertian Fever among Prisoners of War in Russia.]—*Wiener Klin. Wochenschr., Vienna*, xxxv, no. 3, 19th January 1922, pp. 57–58.

Of 600 Austrian officers at Samara, European Russia, half were infected with malaria, and the whole party was evacuated to Krasnoyarsk, Siberia, at the end of September 1918. In the autumn of that year and in spring and summer of 1919 nearly all the remainder became infected with tertian malaria, in spite of the fact that Krasnoyarsk had been previously free from the disease. The latest possibility of infection was in August 1918, and the last tertian infection observed occurred in August 1919, or nearly a year later. All these cases were transferred officers, and the author was unable to find any Anophelines in or near the Siberian camp. He is unable to account for four or five cases of tertian among original members of the second camp, but since they slept next to, or were on very friendly terms with, infected new-comers, he suggests that bed-bugs may have carried the infection.

Sergent (Ed.) & Sergent (Et.). **L'Assainissement de la Corse.**—*Bull. Acad. Méd., Paris*, lxxxvii, no. 6, 7th February 1922, pp. 163–168.

The results of a malaria survey of Corsica are given [*R.A.E.*, B, x, 71].

Golini (O.). **La Deratizzazione e Disinfestazione della Navi a mezzo dell'Acido cianidrico.** [Rat Destruction on Ships by Hydrocyanic Acid Gas.]—*Il Policlinico, Rome*, xxviii, no. 3, 17th January 1922, pp. 88–91.

The process and precautions needed in the fumigation of ships with hydrocyanic acid gas are described. It is suggested that living rats be lowered into the hold as safety indicators after fumigation.

Granderath (F.). **Ueber Sulfoliquid gegen Akarus-Räude.** [The Use of Sulfoliquid against Mange due to Acari.]—*Deutsche Tierärztl. Wochenschr., Hanover,* xxx, no. 26, 1st July 1922, pp. 338–339.

Sulfoliquid, a watery solution of sulphurous acid in a highly viscous medium, is recommended against mange as being free from the disadvantages of the preparations commonly employed.

Kieffer (J. J.). **Chironomides d'Egypte nouveaux ou peu connus (Dipt.).**—*Bull. Soc. Ent. d'Égypte, Cairo,* xiv (1921), 1922, pp. 76–79.

This paper is an extract from one previously noticed [*R.A.E.*, B, ix, 106].

Brug (S. L.) & de Rook (H.). *Bironella gracilis* **Theobald 1905.**—*Geneesk. Tijdschr. Ned.-Indië, Batavia,* lxii, no. 2, 1922, pp. 133–137, 1 plate.

A French version of this Dutch paper has already been noticed [*R.A.E.*, B, x, 172].

Mahulete (J.). **Een en ander over enkele Anophelinen van het eiland Ceram.** [Some Notes on some Anophelines from the Island of Ceram.]—*Geneesk. Tijdschr. Ned.-Indië, Batavia,* lxii, no. 2, 1922, pp. 138–145, 8 figs.

Two Anophelines not in Swellengrebel and Swellengrebel-de Graaf's list [*R.A.E.*, B, viii, 152] were found in the south of Ceram. One is held to be a new variety of *Anopheles* (*Nyssorhynchus*) *mastersi*, for which the name *moluccensis* is suggested, although Swellengrebel considers it to be *A. punctulatus*, Dön. A microscopic examination of the stomachs of sixteen specimens captured indoors showed one to be infected with malaria.

The other Anopheline, of which the larva only was taken, is possibly a species of the subgenus *Stethomyia*. The larvae were found right on the coast in pools of fresh water, together with *A. barbirostris* var. *pallidus* and *A. annulipes* var. *moluccensis*, in the shade and close to habitations.

Two kinds of larvae of *A. barbirostris* var. *pallidus* were found in Ceram. Microscopically the difference proved to be one of pigmentation only, but when bred separately the "white" larvae yielded males and the "black" ones, females.

Walch (E.) & Walch-Sorgdrager (G. B.). **Een Epidemie van Malaria perniciosa en tertiana, in hoofdzaak overgebracht door** *M. sinensis.* [An Epidemic of Malignant and Benign Tertian Malaria, mainly transmitted by *Anopheles hyrcanus.*]—*Geneesk. Tijdschr. Ned.-Indië, Batavia,* lxii, no. 2, 1922, pp. 164–182, 3 figs., 2 tables.

The information given in this paper has already been noticed from another source [*R.A.E.*, B, x, 38].

Edwards (F. W.). **The Carriers of** *Filaria bancrofti.*—*Jl. Trop. Med. & Hyg., London,* xxv, no. 12, 15th June 1922, pp. 168–170, 2 figs.

Culex fatigans, Wied., is now recognised as by far the most important carrier of *Filaria bancrofti,* and is associated with man in practically all tropical lands. It does not occur in Europe or north Africa, so that

the filariasis reported from Egypt and Morocco must be transmitted by some other species, perhaps *C. pipiens*. Other mosquitos in which complete development of *F. bancrofti* has been observed are *Aëdes* (*Stegomyia*) *variegatus*, Dolesch. (*scutellaris*, Wlk., *pseudoscutellaris*, Theo.), which has proved a better transmitter in Fiji than *C. fatigans*, though it is a daytime biter, in connection with which the filarial worms show a reversed periodicity ; *A.* (*Finlaya*) *togoi*, Theo., which is an efficient carrier in Japan, where it is a semi-domestic species ; *Taeniorhynchus* (*Mansonioides*) *africanus*, Theo., or the closely allied *T.* (*M.*) *uniformis*, Theo., either of which may be the carrier in tropical Africa ; *Anopheles* (*Myzomyia*) *subpictus*, Grassi (*rossi*, Giles), a carrier in India, where it is the commonest semi-domestic Anopheline ; *A.* (*M.*) *costalis*, Theo., a carrier in West Africa ; and *A. algeriensis*, Theo., recorded as a host of *F. bancrofti* in Tunis, though probably not numerous enough in most Mediterranean countries to be a serious factor in the transmission of the parasite.

Partial development of *F. bancrofti* has been observed in twenty-two species of mosquitos, including nine Anophelines and eight species of *Aëdes*. Some of the species in the list given will doubtless prove eventually to be good carriers, but in the case of *Aëdes argenteus*, Poir., it seems definitely established that complete development does not take place. A list of fifteen species is given in which examination has given negative results, though three of these also appear in the list in which partial development has been recorded.

SAMBON (L. W.). **Tropical and Sub-tropical Diseases.**—*Jl. Trop. Med. & Hyg., London*, xxv, no. 12, 15th June 1922, pp. 170–185, 12 figs.

This paper, in which considerable space is devoted to insect transmission, has previously been noticed from another source [*R.A.E.*, B, viii, 198].

REDIKORTZEV (V. V.). **К Паразитологии домашних Животных Детского Села.** [On the Parasitology of Domestic Animals in Dietskoya Sielo.]—**Петроградский Агрономический Институт, Научно-Исследовательский Отдел, Энтомологическая Станция** [*Petrograd Agron. Inst., Sci. Expt. Dept., Ent. Sta.*], *Petrograd*, Ser. A, no. 2, 1922, 4 pp.

This list of parasites taken from sick or dead animals during 1921 includes : *Sarcoptes scabiei* var. *equi*, Gerl., from the skin of horses ; *Haematopinus suis*, F., from the skin of pigs ; *Trichodectes climax*, Nitzsch, from goats' hairs ; *Menopon pallidum*, Nitzsch, and *Lipeurus variabilis*, Nitzsch, from the feathers of a cock ; *Gastrophilus pecorum*, F. (larvae of all stages) from the stomach of a horse ; and *Hypoderma bovis*, DeG. (mature larvae) from the skin of cattle.

BEQUAERT (J.). **The North American Species of** *Cryptolucilia*, **Brauer and Bergenstamm** (*Pseudopyrellia*, **Girschner**) (**Diptera, Anthomyidae**).—*Psyche, Boston, Mass.*, xxix, no. 3, June 1922, pp. 89–91.

Owing to evident confusion between *Cryptolucilia caesarion*, Meig., and *C. cornicina*, F. (common blue-green Anthomyiid flies), the main differences between them are pointed out. The generic name *Cryptolucilia*, B. & B., has priority over *Pseudopyrellia*, Girsch., and the genus

belongs to the ANTHOMYIIDAE as defined by Girschner. The species of *Cryptolucilia* have long been placed among *Lucilia*, which they resemble in general appearance, but from which they can easily be separated by the absence of hypopleural bristles and by the arrangement of the sternopleural bristles.

HUSSEY (R. F.). **A Bibliographical Notice on the Reduviid Genus** *Triatoma* **(Hemip.).**—*Psyche, Boston, Mass.*, xxix, no. 3, June 1922, pp. 109–123.

Among many papers on the biology and taxonomy of the genus *Triatoma* (written chiefly between 1910 and 1914), some of which have been previously noticed [*R.A.E.*, B, i, 176; ii, 107], the author discusses in particular the work of Neiva and that of del Ponte [*R.A.E.*, B, ix, 197], which form important summaries of the known data concerning this genus of blood-sucking Reduviids. A list is given of thirty-nine species, with their synonymy and distribution and a bibliography of recent contributions to the subject.

CAMERON (A. E.). **The Morphology and Biology of a Canadian Cattle-infesting Black Fly,** *Simulium simile*, **Mall. (Diptera, Simuliidae).** —*Canada Dept. Agric., Ottawa*, Bull. N.S. no. 5 (Ent. Bull. 20), 1922, 26 pp., 9 figs.

Since the publication of preliminary observations on *Simulium simile* [*R.A.E.*, B, vi, 179] the author has made a further study of the species, and has reared it under conditions approximating as nearly as possible to the natural habitat. Descriptions are given of the various stages, which were not previously known. All the immature stages of the fly are passed in the stony rapids of the north and south Saskatchewan rivers. The eggs are deposited in cake-like masses, embedded in a soft, gelatinous matrix on the stones near the water-line, where they are kept moist by the spray. These masses consist of thousands of eggs in a single layer, which are apparently the product of a large number of females. The larvae feed chiefly on diatoms and form large colonies on the stones, as do the pupae. There are probably four generations in a year in central Saskatchewan, but owing to variations in the time of development, the dates of appearance and periods of persistence of the generations are not well defined. Larvae begin to appear in the first stage as soon as the temperature of the water reaches about 50° F., that is, some time in June, and both larvae and pupae occur onwards until October. They are most numerous during the early part of the summer, when the water is high and reaches a temperature of about 75°; the numbers diminish later in the summer owing to the reduction in the extent of the breeding-grounds caused by the recession of the water. The mortality among larvae and pupae due to desiccation arising from the periodic fall of the water-level is sometimes very great, and probably explains in some measure the variation in the number of adults from year to year.

The stage of hibernation is not definitely known, but is probably the egg stage; it appears possible that this stage may retain its vitality for longer or shorter periods although deprived of moisture. Emergence of the adults takes place from about June to September in large swarms, in which males and females occur in about equal numbers. The adults, upon their emergence, are frequently carried by the wind for a distance of perhaps ten or twelve miles. The mortality among emerging adults by drowning is often very large.

The adult female is an inveterate blood-sucker, attacking cattle, horses and mules, but not apparently human beings. The attacks are remarkably persistent, the flies being considered in some districts to be responsible for the death of their hosts. It is not known whether death has been caused by continued loss of blood from the many lesions, by suffocation due to the animals inhaling the swarming insects with resulting obstruction of the bronchi, by the injection of some toxic substance produced in the salivary glands, or owing to the presence of a pathogenic micro-organism of which the fly may be the vector. Investigations into the last possibility have given entirely negative results.

Development of the ovaries of *S. simile* seems to depend upon the ingestion of a blood-meal, and at least ten days must intervene after full engorgement before they are completely developed. Whether the flies may become engorged and oviposit more than once is difficult to determine, as the females are not easy to experiment with in captivity, but the presence of both mature and immature eggs in the ovaries of individuals that have completely digested a blood-meal is considered significant.

The nymphs of may-flies, particularly *Heptagenia* sp., feed extensively on the larvae of *S. simile* and considerably reduce their numbers. Stone-fly and dragon-fly nymphs also devour them. The most important enemy, however, is the sucker-fish, *Catastomus commersonii*, which feeds almost exclusively on larvae and pupae of *S. simile*.

The only measure that promises any success in the control of the flies is the use of repellents on the animals. Besides those previously suggested [*loc. cit.*], a mixture of 2 gals. kerosene with ½ lb. soft soap to 1 gal. of water is recommended, 1 part being used to 5 parts of water as a spray. An alternative is a mixture of 2 parts pulverised resin, 1 part soap shavings, ½ part water and 1 part fish-oil, which are boiled together until the resin is dissolved; 1 part oil-of-tar, 1 part kerosene and 3 parts water are then added, and the whole stirred and boiled for fifteen minutes. When cool this can be used as a spray, but the objection to either spray is that applications are necessary at least once or twice each day, while the oily mixtures tend to make the animals very dirty. Phinotas oil is effectual in killing the larvae by contact, but the use of miscible oil is scarcely practicable in the swift-running rivers.

Adult females of the small-stream species, *S. venustum* and *S. vittatum*, are also blood-suckers; these species can more easily be dealt with in the larval stage by the oiling method.

CRAWLEY (H.). **A Case of Demodectic Mange in a Bull.**—*Jl. Amer. Vet. Med. Assoc., Washington, D.C.*, lxi, N.S. xiv, no. 4, July 1922, pp. 441–443, 1 fig.

A case is recorded of *Demodex bovis* being taken from pustules on the skin of a pure-bred Guernsey bull in Pennsylvania, the organisms being present in great numbers. Cows of the same herd did not appear to be infested with mange mites of any kind. Records of the occurrence of *Demodex* in cattle are rare; it has been found in Nyasaland [*R.A.E.*, B, iii, 119] and in American cattle (*Canadian Entomologist*, 1892), but in view of the present finding the condition may be much commoner than has been supposed.

GILRUTH (J. A.). **The Control and Eradication of Tick Fever or Texan Fever of Cattle in the United States of America.**—*Melbourne*, Govt. Printer, February 1920, 22 pp., 3 maps, 1 plate. [Received 13th July 1922.]

The work of eradication of the cattle tick, *Boophilus annulatus*, in the United States, as carried on for the past thirteen years by the Federal Government, is reviewed.

MACFIE (J. W. S.) & INGRAM (A.). **On the Genital Armature of the Female Mosquito.**—*Ann. Trop. Med. & Parasit., Liverpool*, xvi, no. 2, 20th July 1922, pp. 157–188, 23 figs.

The results of a preliminary examination of the differential characters of the genital armature of female mosquitos are recorded, fifty West African species belonging to 16 genera having been used for the purpose. In general, well-marked differences were found between distinct genera or subgenera, but only slight ones between species of the same genus. The degree of resemblance is, however, very variable ; in the case of *Mimomyia* and *Ochlerotatus*, for example, there are such notable differences between certain species that the authors consider them almost generic.

EVANS (A. M.). **Notes on Culicidae in Venezuela, with Descriptions of New Species. Part II.**—*Ann. Trop. Med. & Parasit., Liverpool*, xvi, no. 2, 20th July 1922, pp. 213–222, 1 plate.

Mosquitos received from the regions of Caracas and Maracay since the previous report [*R.A.E.*, B, x, 62] include, in addition to species therein mentioned, *Anopheles maculipes*, Theo., *A.* (*Arribalzagia*) *venezuelae*, sp. n., which is described from one female, the characters differentiating it from *A. punctimacula*, D. & K., being given ; *Limatus durhami*, Theo. ; *Culex declarator*, D. & K. ; *C. corniger*, Theo. ; *Aëdomyia squamipennis*, Arr. ; *Taeniorhynchus* (*Mansonia*) *titillans*, Wlk. ; *Psorophora posticata sayi*, D. & K. ; *P. lutzi*, Theo. ; *P. saeva*, D. & K. ; *P. ciliata*, F. ; *P.* (*Janthinosoma*) *tovari*, sp. n., of which the female is described ; and *Aëdes* (*Finlaya*) *oswaldi*, Lutz.

Examination of a species of *Arribalzagia* from the Panama Canal Zone indicates that the characters defined by Dyar for species of that subgenus may be extremely variable. It seems probable that *Anopheles venezuelae* may be in reality a variety of *A. punctimacula*, D. & K. Further investigations on this point are being made.

MILLER (D.). **Insect Notes : 1921–22 Season.**—*N.Z. Jl. Agric., Wellington*, xxiv, no. 5, 20th May 1922, pp. 294–296.

Pests of live stock during the season 1921–22 include : *Melophagus ovinus*, *Oestrus ovis*, *Pollenia stygia* and *Lucilia sericata* infesting sheep ; *Gastrophilus intestinalis* and *G. nasalis* infesting horses ; *Haemaphysalis bispinosa* on cattle ; and several species of sheep and cattle lice. *Linognathus stenopsis* (goat louse) was intercepted in quarantine on a young goat from England.

CONNAL (A.) & CONNAL (S. L. M.). **The Development of** *Loa loa* **(Guyot) in** *Chrysops silacea* **(Austen) and in** *Chrysops dimidiata* **(van der Wulp).**—*Trans. R. Soc. Trop. Med. & Hyg., London,* xvi, no. 1–2, 16th March & 18th May 1922, pp. 64–89, 5 plates, 1 map, 10 figs.

This paper is an amplification of observations made at Sapele [*R.A.E.*, B, x, 42], and also includes confirmatory results obtained at Calabar

Development of *Filaria* (*Loa*) *loa* occurred equally in *Chrysops silacea* and *C. dimidiata*. Under experimental conditions, flies remained infective for five days, but it is possible that infectivity persists even longer. The flies will bite natives more readily than Europeans, and also show a preference for dark surfaces, as they apparently preferred the black areas on the skin of guinea-pigs to the white ones.

There is great disparity in size of the developing forms of *F. loa*, which is accounted for by the delayed development of many of the embryos in the stomach of the fly, where they have been found as long as three days after ingestion.

O'KANE (W. C.). **One Year of the Crop Protection Institute.**—*Jl. Econ. Ent. Geneva, N.Y.*, xv, no. 3, June 1922, pp. 209–213.

One of the projects of the crop protection institute was preliminary work relating to the ox warbles, *Hypoderma lineatum* and *H. bovis*. The assistance of the Tanners' Council was sought and an appropriation of £1,800, extending over a period of three years, was secured. This appropriation is contingent on the securing of necessary funds from other sources, in which connection several counties in New York State have been approached. The proposed three-year programme involves from 40,000 to 60,000 head of cattle. It is hoped to start the necessary preliminary work in the winter of 1922.

DYAR (H. G.). **The Mosquitoes of the United States.**—*Proc. U.S. Nat. Mus., Washington, D.C.*, lxii, Art. 1, no. 2447, 1922, pp. 1–119.

The United States as considered for the purpose of this paper embraces the region between the Canadian and Mexican boundaries, including southern Florida and Alaska and comprising three main faunal regions. The most northern of these is the Canadian zone (excluding Alaska), the mosquitos of which have been dealt with elsewhere [*R.A.E.*, B, ix, 113]. The modified Canadian fauna occurring in the mountains bordering the Pacific coast, the Cascades and Sierra Nevada are included in the present paper. The second faunal region comprises the coastal area on the Pacific between the mountains and the sea, beginning in Washington State and extending up the coast to Alaska. The third region extends from Mexico upwards through the Mississippi Valley. In general the species are adapted to arid conditions, in contrast to the species of the Canadian fauna in connection with which melted snow forms a prominent factor.

The nomenclature followed is that adopted by Howard, Dyar and Knab, in *The Mosquitoes of North and Central America and the West Indies*, 1912–1917.

Keys are given to the tribes, genera and species occurring in the United States; these include *Aëdes* (*Heteronycha*) *iridipennis*, sp. n., described from a single female from Arizona. This species may be found to fall in *Taeniorhynchus* when the male is known.

Report of the Proceedings of the Hayling Mosquito Control from September, 1920, to June, 1922.—*Southsea*, 1922, 12 pp., 8 figs.

The anti-mosquito work at Hayling Island [*cf. R.A.E.*, B, x, 120] during 1922 included experiments with fish as destroyers of the larvae. In this connection *Gobius microps*, found in sea-filled ditches, gave promising results as a possible check upon the activities of *Aëdes* (*Ochlerotatus*) *detritus*.

Martini (E.). **Bestimmungsschlüssel für die deutschen Stechmücken-Arten.** [A Key to German Mosquitos.]—*Wiener Ent. Zeitg.*, *Vienna*, xxxix, no. 1–4, 30th March 1922, pp. 97–104. [Received 20th July 1922.]

Since the publication of the author's monograph on European mosquitos [*R.A.E.*, B, ix, 35], further species have become known, and these probably occur in Germany, Austria, etc. This key covers all the above species.

Carpano (M.). **Sulla Piroplasmosi equina in Italia.** [Equine Piroplasmosis in Italy.]—*La Clinica Veterinaria, Milan.* (Abstract in *Ann. d'Igiene, Rome*, xxxii, no. 5, May 1922, pp. 409–410.)

The author shows experimentally that the blood of horses affected with *Babesia caballi* ceases to be infective when the animals are clinically cured, whereas that of horses affected with *Nuttallia equi* remains infective many months after the animals are cured, so that they remain reservoirs and carriers of the virus. This explains the epizootic differences between the two forms of piroplasmosis concerned. That due to *B. caballi*, which in Italy is transmitted by *Boophilus* (*Margaropus*) *annulatus*, has a very restricted geographical distribution, partly because the tick must attach itself while the horse is suffering from the disease, and partly also because this tick, once attached, remains all its life on a single host. That due to *N. equi*, on the contrary, is much more widespread. The vector, *Rhipicephalus bursa*, can become infected on horses that have recovered months previously, and as it passes its life-cycle on two separate hosts, the infection acquired from one horse may be passed on to another.

Blanchard (—), Lefrou (—) & Laigret (—). **Note préliminaire sur des cas d'Ictères épidémiques observés à Brazzaville (A. E. F.).** —*Bull. Soc. Path. Exot.*, *Paris*, xv, no. 6, 14th June 1922, pp. 385–387.

From December 1921 to April 1922 fifteen cases of infectious jaundice were observed in natives from the south-east of the French Congo. Blood from one case was inoculated into a guinea-pig, which then died of a conjunctival jaundice, spirochaetes similar to those in the patient being found in its blood and internal organs. Sixteen bed-bugs, *Cimex lectularius*, from the beds of some of the patients were ground up, and a guinea-pig, inoculated with an emulsion prepared from them, also succumbed to conjunctival jaundice. An emulsion of its liver proved fatal to another guinea-pig, in which spirochaetes similar to those in patients and in the guinea-pig mentioned first were found. It would therefore appear that the causal organism of a grave form of jaundice and at least one of its vectors were observed.

FRANCHINI (G.). **Sur une Amibe particulière d'une Asclépiadacée** (*Chlorocodon whitei*).—*Bull. Soc. Path. Exot., Paris*, xv, no. 6, 14th June 1922, pp. 393–398, 3 figs.

Besides the *Amoeba* already noticed in Asclepiadaceae under glass in Paris [*R.A.E.*, B, x, 145] *Amoeba chlorocodonis*, sp. n., has been discovered in the latex of *Chlorocodon whitei*. No experiments regarding its pathogenicity to animals have yet been made, but it does not phagocytise the red blood corpuscles.

FRANCHINI (G.). **Flagellés et Amibes d'une Urticacée exotique,** *Ficus parietalis*.—*Bull. Soc. Path. Exot., Paris*, xv, no. 6, 14th June 1922, pp. 399–404, 3 figs.

Hitherto there has been no mention of true flagellates in the latex of Urticaceae. A flagellate closely allied to *Herpetomonas*, which is here described, was found in the fruit of an exotic species, *Ficus parietalis*, in the hot-houses of the Paris Museum. The same plant harbours *Herpetomonas*, *Crithidia* and trypanosomes, and it should be remembered that some insects can harbour all three of these parasites in their digestive tubes. In the fruit-tissues the parasite increases rapidly, having the appearance of leishmaniform parasites and minute trypanosomes.

ROUBAUD (E.) & FRANCHINI (G.). **Infection naturelle de la Souris par les Flagellés de la Puce,** *Ctenopsylla musculi*, **Dug.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 6, 14th June 1922, pp. 405–406.

This note describes experiments in which mice were naturally infected by a flagellate, *Herpetomonas* (*Leptomonas*) *ctenopsyllae*, occurring in fleas, *Ctenopsylla musculi*, Dug., living on the mice. Although the fatal pathogenic character of the infection is probable, the parasite being found in the internal organs, the rapid death of the mice must have been caused by exhaustion due to the fleas, because infected mice sheltered from fleas lived for several months. The question is justified, whether in nature there exists a normal cycle of *H. ctenopsyllae* from mouse to flea.

ROUBAUD (E.) & FRANCHINI (G.). **Infection leishmaniforme produite chez la Souris par l'Inoculation des Fèces de la Puce,** *Ctenopsylla musculi*.—*Bull. Soc. Path. Exot., Paris*, xv, no. 6, 14th June 1922, p. 407.

The bodies of the dead mice from the breeding cages of *Ctenopsylla musculi*, Dug., infected with *Herpetomonas* (*Leptomonas*) *ctenopsyllae* [see preceding paper] were covered with the dried excreta of the fleas. A solution of the excreta was inoculated into a mouse ; and leishmaniform parasites were afterwards found in its blood and internal organs.

FRANÇA (C.). **Sur les Flagellés parasites des Latex (à propos de la Note de M. Franchini).**—*Bull. Soc. Path. Exot., Paris*, xv, no. 6, 14th June 1922, pp. 408–410.

In reference to Franchini's note [*R.A.E.*, B, x, 145] the author reviews the facts as at present established.

Latex plants can harbour in the latex flagellate protozoa of different species, which have Rhynchota as primary hosts. For example,

Leptomonas davidi, which parasitises *Euphorbia*, has *Stenocephalus agilis* as its primary host, in which development continues up to the salivary metacyclic forms. Besides these primary hosts, the Leptomonads may perhaps be transmitted mechanically by other bugs. In the case of *Stenocephalus* there are strains with a marked receptivity for *Leptomonas davidi*, while others display a marked resistance to the infection. This is of importance in view of the objection to the hypothesis of the transmission of *Leishmania donovani* by bed-bugs, based on the much greater extent of the distribution of *Cimex* as compared with that of kala-azar.

PARROT (L.) & DONATIEN (A.). **Un nouveau cas sporadique de Bouton d'Orient sur le littoral algérien.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 6, 14th June 1922, pp. 410–412.

An isolated case of Oriental sore is recorded from a locality on the Algiers-Tunis railway, within the zone of distribution of *Phlebotomus papatasii*. The ground is very broken and covered with the vegetation characteristic of the Mediterranean coast. A rapid search that was made in the outhouses of an inn resulted in the capture of one male and two females of *Phlebotomus* (*Sergentomyia*) *perniciosus*, which is constantly associated with *P. papatasii* on the Algerian coast.

DARTIGOLLES (R.). **Un Cas de Myiase nasale en Guinée.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 6, 14th June 1922, p. 416.

A case of nasal myiasis due to *Chrysomyia putoria*, Wied., is recorded from French Guinea.

DELANOË (P.). **Le Mouton Piège à Puces.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 6, 14th June 1922, pp. 416–418.

With reference to the oil trap for fleas described by him [*R.A.E.*, B, x, 101], the author states that a live sheep is quite as practical a trap, as the wool fat asphyxiates the fleas. There may also be a possible toxic action of the fat. It is well to starve the fleas for a few days before introducing the sheep. These animals are particularly suited for the purpose of clearing such flea-infested buildings as pig-sties, where the oil trap is unsuitable. The pulicidal property of sheep fleeces explains why these animals are free from fleas. It is known that the sheep ticks, especially *Rhipicephalus*, infest the ear, and the author believes that this place is chosen as a shelter against the noxious action of the wool fat. According to a statement by Dr. Weisgerber, a sheepskin, even if washed, can serve as a flea-trap, and the natives advised him to use a sheepskin as a bed mat in order to rid himself of fleas. He thinks that the flea is held captive by the hairs.

DELANOË (P.). **Au Sujet d'*Ornithodorus marocanus*, Vélu 1919.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 6, 14th June 1922, pp. 418–420.

In a further note on *Ornithodorus marocanus*, Vélu [*R.A.E.*, B, vii, 86] it is stated that this tick was recently captured in hundreds in pig-sties in Morocco underneath palm leaves strewn on the ground

and in the damp, sandy soil under the leaves. The bite of *O. marocanus* is not dangerous to man ; cases in which a European and natives were freely bitten without serious consequences are mentioned.

DELANOË (P.). **De l'Utilisation des Tonneaux comme Cages à Animaux de Laboratoire.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 6, 14th June 1922, pp. 420–423, 2 figs.

The transformation of barrels into breeding-cages for laboratory animals is described ; oil barrels are preferable as they do not rot and they also resist heat better than others.

LÉGER (M.) & BAURY (A.). **Recherches sur l'Index endémique du Paludisme en Guinée.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 6, 14th June 1922, pp. 497–499.

The authors have recently ascertained the blood index and the spleen index in children in French Guinea who did not complain of fever. The investigations were conducted in February, in the middle of the dry season, and show that the active power of malarial infection remains high at that season. *Plasmodium malariae* occurred in 38 cases; *P. praecox* in 27 ; and *P. vivax* in none. A spleen index of under 10 corresponded to a parasite index of about 50. The infection by *P. malariae* does not seem to follow a previous infection by *P. praecox*. At this season of the year, Anophelines are very rare in French Guinea, at least at Conakry and Kindia. Only one specimen, *Anopheles (Pyretophorus) costalis*, was captured.

Hommage à A. Laveran.—*Arch. Inst. Pasteur Afr. Nord, Tunis*, ii, no. 2, June 1922, pp. 157–164, 1 portrait.

In honour of the late Prof. Laveran, reprints are given of four of his earliest papers on the subject of the haematozoa causing malaria.

HORNUS (P.). **Note sur les Formes atypiques de** *Plasmodium praecox*. —*Arch. Inst. Pasteur Afr. Nord, Tunis*, ii, no. 2, June 1922, pp. 227–229, 12 figs.

Since the publication of Vialatte's paper [*R.A.E.*, B, x, 48] the author also has observed atypical forms of *Plasmodium praecox*, always in association with schizonts and crescents. He is of opinion that these forms are probably normal in the development of *P. praecox*, but that they are retained in the deep-seated organs and do not pass into the peripheral blood stream, except in the case of a weakening of the system in very severe illness.

LONJARRET (—). **La Trypanosomiase Humaine dans le Territoire du Togo.**—*Ann. Méd. & Pharm. colon., Paris*, xx, no. 1, January–April 1922, pp. 18–21.

The occurrence of sleeping sickness in Togo is compared with that of other diseases. It is considered that the Germans exaggerated its importance in that locality, and that anything beyond the usual precautionary measures is not warranted.

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THE REVIEW OF APPLIED ENTOMOLOGY

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AUSTEN (E. E.) & HEGH (E.). **Tsetse-flies. Their Characteristics, Distribution and Bionomics with some Account of possible Methods for their Control.**—*London*, Imp. Bur. Ent., 1922, Roy. 8vo, ix + 188 pp., 5 plates, 19 figs., Price 7*s*. 6*d*.

Since the publication of Hegh's account of the subject [*R.A.E.*, B, iv, 36], a very large amount of work, especially in the British Colonies and Protectorates, has been done on the biology of the various species of *Glossina*. The information thus acquired is scattered among a large number of scientific and medical journals, and the difficulty that would face an investigator who wished to collect it as a preliminary to further work would be great—in Tropical Africa almost insuperable.

These considerations have rendered necessary the preparation of the volume under review, which, as the very extensive bibliography of publications consulted indicates, contains the information required to bring Hegh's account up to date, and which furnishes a thoroughly comprehensive résumé of the present knowledge of the subject.

WOLBACH (S. B.), TODD (J. L.) & PALFREY (F. W.). **The Etiology and Pathology of Typhus: Being the Main Report of the Typhus Research Commission of the League of Red Cross Societies to Poland.**—*Cambridge, Mass.* (League of Red Cross Societies), Harvard Univ. Press, 1922, Imp. 8vo, x + 222 pp., 13 figs., 34 plates. [Price 35*s*.]

As a main result of their investigations [*cf. R.A.E.*, B, ix, 137], the Commission reached the conclusion that the specific cause of typhus is *Rickettsia prowazeki*. So far as the insect host was concerned the experiments were made with lice that were certainly free from *Rickettsia* or the virus of any disease. They were fed on cases of clinically well-established typhus, and emulsions of their viscera were then injected into guinea-pigs. The fact that these lice acquired only *R. prowazeki* in the way of demonstrable micro-organisms from the typhus patients is in itself strong evidence for the relationship of *R. prowazeki* to typhus ; but the experiments in inoculation in guinea-pigs appear to prove conclusively that the virus of typhus is not separable in the louse from *R. prowazeki*, and this the authors consider to be the most important part of their evidence. It was supported, also, by a large number of histological observations on the human subject, the presence of bodies indistinguishable from *R. prowazeki* being demonstrated with great regularity in the lesions of typhus in man.

The lice do not invariably become infective when fed upon typhus patients ; and it would appear that the mechanism of typhus transmission is an imperfect one in more than one respect, for *R. prowazeki* eventually destroys the louse, which is an unusual effect of a parasite upon its intermediate host.

The mode of conveyance of the virus from the louse to the human subject was not demonstrated. It is certain that *R. prowazeki* escapes from the alimentary tract with the faeces and may, therefore, be introduced by scratching or by the mouthparts of the lice after becoming soiled with faeces. In no instance were *Rickettsia* observed in the salivary glands or oesophagus of the lice.

An incident of considerable interest occurred during the research, when one member of the Commission was taken ill with trench fever, the lice that were fed on him thereafter becoming heavily infected

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with bodies identified as *R. pediculi*. The Commission regards these as identical with *R. quintana* and *R. wolhynica*, all three being forms that have been described by different observers as the causal agent of trench fever.

Müller (A.) & Rasch (W.). **Schädliche Insekten und Nager.** [Injurious Insects and Rodents.]—*Frankfurt a. Main*, Deutsche Ges. f. Schädlingsbekämpfung, 1922, 23 pp., 2 col. plates.

The pests dealt with include the principal insects attacking man or his household goods and foodstuffs. In the case of each insect general notes are followed by short descriptions of the various stages and of their biology. The aim of this pamphlet is to popularise exact information regarding these pests, and this is achieved in a simple and effective manner.

Rudolfs (W.). **Chemotropism of Mosquitoes.**—*New Jersey Agric. Expt. Sta., New Brunswick*, Bull. 367, March 1922, 23 pp., 1 fig. [Received 1st August 1922.]

The object of these experiments was to investigate the general causes that excite mosquitos to attack man. Previous work on the effect of colour, light, humidity, odour and temperature, is reviewed, and the technique employed in the present observations is described. As no " standards " for the behaviour of mosquitos upon reception of chemical stimuli were known to the author, this has been recorded in terms of activity, particulars of which are given. The work was carried out on *Aëdes sollicitans* and *A. cantator* in open salt marsh meadows near the coast of New Jersey, 8–14 freshly caught individuals being used for each experiment. Attractive and " activating " substances were tested again in the open with larger quantities. The observations on the influence of temperature and the human breath are similar to those of other authors [*R.A.E.*, B, x, 135].

The substances are divided into several classes : attractive, activating merely, indifferent and repellent, and the results are summarised by the author as follows :—

Perspiration, blood, urine and sebaceous secretion (human and cow) proved unattractive. Some of their constituents and intermediate decomposition products were decidedly attractive (phenylalanine, haemoglobin). Several amino-acids influenced the activity of mosquitos or induced them to suck. Carbon dioxide and ammonia, ultimate decomposition products of the human body, proved to be strongly activating, inducing the insects to stab and to exhibit " satisfaction " or " pleasure." A combination of carbon dioxide and ammonia with a particular temperature and degree of moisture (such as to reproduce the conditions of the breath) was highly activating. It seems that these stimuli, produced in quantity by the human body, play an important rôle in the attraction of mosquitos. This explains why a motionless sleeper and animals of great variety, amphibians, reptiles, birds and mammals, are all subject to attack.

Baerg (W. J.). **Regarding the Habits of Tarantulas and the Effects of their Poison.**—*Scientif. Mthly., Garrison, N.Y.*, xiv, no. 5, May 1922, pp. 481–488, 5 figs.

Experiments made in Arkansas to determine the degree of noxiousness of the poison injected by the tarantula, *Eurypelma steindachneri*,

Auss., are described. Tests were made with a guinea-pig and a rat, and finally the author allowed himself to be bitten four times on the finger, poison being injected each time. In no case was there any ill effect beyond temporary pain at the point of injection. The rat was the most affected, showing periods of restlessness and of coma for about four hours, after which it entirely recovered.

INGRAM (J. H.). **Delouser.**—*China Med. Jl., Shanghai*, xxxvi, no. 3, May 1922, pp. 225–229, 2 plans.

The construction of a delousing and disinfecting apparatus with attached bathroom and dressing rooms is described. A few hours of firing causes the temperature to rise above 80° C. [176° F.], and only 20 minutes is required to kill all lice and their eggs, the floor becoming sufficiently hot to kill all vermin as they fall and the double walls with an air space between them minimising the radiation of heat.

YOUNG (C. W.). **Delousing with special reference to the Ingram Apparatus.**—*China Med. Jl., Shanghai*, xxxvi, no. 3, May 1922, pp. 230–242.

The history of the utilisation of heat for destroying lice in clothing, etc., is reviewed. The apparatus recorded in the preceding paper was selected on account of its simplicity and economy in construction and operation, and was found to work satisfactorily. One of the advantages of the dry heat method is that the disinfected clothing is immediately ready for wearing. Details are given as to the protective clothing and organisation of the personnel and of the control of the patients. Kerosene emulsion was used for the hair, and some account is given of the pediculicides recommended by various authors, especially naphthaline.

SOBRERO (L. R.). **La Sarna del Ganado Lanar.** [Sheep Mange.]—*Gaceta Rural, Buenos Aires*, xv, no. 179, June 1922, pp. 1237–1245.

An account is given of the symptoms and nature of mange in sheep, and of the life-history and habits of the mite, *Psoroptes communis*, var. *ovis*, that causes it. It is pointed out that the most important factor in the dissemination of mange among sheep is the practice, common in South America, of keeping rams from many flocks together under one shepherd, until such time as they are distributed among the various flocks of ewes. If any of the rams become infested, they probably communicate the disease to all the others, with the result that it is distributed among all the various flocks to which they belong. It is estimated that 90 per cent. of infestation is caused in this way, and it is recommended that all rams should be dipped shortly before they are distributed among their flocks.

NIESCHULZ (O.). **Unsere bisherigen Kenntnisse von der Flagellatenkrankheit der Pflanzen.** [Our Present Knowledge of the Flagellate Disease of Plants.]—*Zeitschr. Pflanzenkrankh. u. Gallenkunde, Stuttgart*, xxxii, no. 3–4, 1922, pp. 102–108, 2 figs.

The title of this article indicates its contents.

Eckstein (F.). **Die Verbreitung von *Anopheles* in Bayern und ihre mutmassliche Bedeutung für die Einschleppung der Malaria.** [The Distribution of *Anopheles* in Bavaria and its Importance in connection with the Introduction of Malaria.]—*Zeitschr. angew. Ent., Berlin,* viii, no. 2, May 1922, pp. 229–282, 1 map.

Some of the earlier results of these investigations, made in 1919–21, have been noticed [*R.A.E.*, B, viii, 171].

The female of *Anopheles plumbeus* (*nigripes*) does not appear to go far from the tree-holes that constitute its breeding places. The larvae are most frequently found in beech trees, probably because they commonly provide suitable hollows. It appears to hibernate in the egg stage and to have 2–3 generations in the course of a summer, the number depending largely on the early transfer of the eggs into water by heavy showers, and under particularly favourable conditions a fourth generation may be possible. *A. plumbeus* is not plentiful, probably owing to the specialised breeding places required. It is widely distributed, and has been found at altitudes of about 3,300 ft. Being distinctly a forest species, its importance as a carrier of malaria is extremely slight and probably non-existent in practice.

The female of *A. maculipennis* hibernates in cellars, sheds and untenanted rooms, sometimes in stables. It prefers more sheltered and drier positions than those sought by the females of *Culex pipiens*. Very slow-flowing clear water is preferred for oviposition, but rain-water barrels with fairly clean contents are also used. The males appear somewhat earlier than the females from the same batch of eggs; they remain near the breeding place. The development of *A. maculipennis* requires 3–4 weeks and in each of the three years there were three generations.

A. bifurcatus is not so particular as *A. maculipennis* in its choice of breeding places, polluted water—such as flows from factories—being used, and it also seems to be more numerous in high districts. It is less prone to enter stables, preferring the open air. In general it is more aggressive and bites at all times of the day, even in cool, rainy weather, which is rarely the case with *A. maculipennis*. It hibernates in the larval stage. The fact that nearly all the larvae in a breeding place are of the same size is against the assumption that females can hibernate also. The hibernated larvae seem to complete their development by the middle or end of May, sometimes earlier, so that the adults are present from mid-May onwards. From this date the larvae disappear until August and September. Even in October the females bite readily. In September and October they lay the eggs from which the hibernating larvae hatch. *A. bifurcatus* thus appears to have only two annual generations. As it is quite possible that a high-lying locality apparently free from *A. maculipennis* may also seem free from *A. bifurcatus* owing to the examination being made when the larvae have completed development, a second spring examination or one in autumn must be made before the locality can be pronounced to be free from infestation.

The author's observations point to *A. maculipennis* being, like *A. bifurcatus*, but more so, a pest of domestic animals rather than of man. If cattle and goats are housed together, more mosquitos settle above the goats, probably because they seek the darkest corners. Few mosquitos occurred in stables, and where horses and cattle were kept together they remained near the latter.

Detailed information is given as to the breeding places found in this survey, and the distribution of Anophelines in Bavaria is dealt with very fully. There is a general distribution of Anophelines, which were absent only in a very few localities and then only owing to the lack of suitable breeding places. In the Bavarian Alps the altitude range extends up to about 3,300 ft.

The past distribution of malaria in Bavaria is described; the possibility of an endemic spread of the disease is considered remote. The almost complete disappearance of the disease in the last 50 years is due to improved hygienic conditions and to the greater dryness of the country, the level of the subsoil water having fallen owing to drainage, etc.

Konsuloff (S.). **Die Bekämpfung der Malariamücken in den Reisfeldern.** [The Control of Malaria Mosquitos in Rice Fields.]—*Zeitschr. angew. Ent., Berlin,* viii, no. 2, May 1922, pp. 283–294.

The economic value of rice fields, which produce a world crop of 120 million tons, renders measures against the Anopheline larvae that breed profusely in them of great importance. In Europe rice is grown in Spain, Italy, Macedonia and South Bulgaria, and for lack of a suitable method of dealing with the mosquitos the plan has been followed of prohibiting rice cultivation within a certain distance of towns and villages.

Attempts to check the larvae by means of fish and other natural enemies have had no real success. The only practical measure consists in allowing the fields to dry up some few times during the rice-growing season. Celli and Casagrandi found that larvae of *Culex* could live on damp ground and that pupae developed on dry sand, and this caused Grassi to abandon the idea of intermittent irrigation. The author, however, points out that no examples of *Anopheles* were used in these experiments, which were made in the laboratory. Finding that the resistance of these two genera differs, and that the resistance of a larva varies with its stage of development, he reinvestigated the question. An examination of the resistance of the larvae and pupae of *Anopheles maculipennis*, Meig., to heat, desiccation and asphyxiation gave the following results.

Larvae and pupae freshly collected in the open were placed in a thermostat at 32° C. [89·6° F.]. After 12 hours, larvae of all three stages were alive, some of the pupae had yielded adults and others had died; this applied to specimens in water. On damp earth a few only of the first and second stage larvae were dead, but all the third stage larvae were dead, together with some of the pupae, while the remainder of the latter had yielded adults. In water at 35° C. [95° F.] after 24 hours all the larvae of the first and second stages were dead, while of the pupae some were dead, some were alive and some had yielded adults. On damp earth all the larvae (except two of the second stage) were dead, and of the pupae some had yielded adults, others were dead and one was alive. At 37° C. [98·6° F.] all the larvae and pupae, except a few of the latter that had yielded adults, were dead after 24 hours in water. All died after six hours on damp earth.

The joint action of incomplete desiccation and direct sunlight was tested in the open air at Sofia. The experiments were made in August,

the temperature of the damp ground at a depth of $\frac{2}{5}$ in. being between 30° C. and 37° C. [86–98·6° F.]; the surface, on which the larvae rested, was much warmer, and this was the real cause of the death of all the larvae and pupae within one or two days.

Resistance to desiccation was tested with a thin layer of damp earth in glass dishes. After a few hours in indoor shade at 20° C. [68° F.] the earth was friable. On the following day water was poured on. The first stage larvae and pupae soon came to the surface. Many of the second stage larvae (all of which were alive) remained stuck to the bottom and perished. Nearly all the third stage larvae freed themselves and rose to the surface. In another experiment all the larvae and pupae were killed by 43 hours' desiccation. In a further test the earth was kept moist, and all the larvae were active three days later.

To test the resistance to asphyxiation of larvae and pupae stuck to the bottom, test-tubes filled with water were sealed with liquid paraffin. After one hour all the first stage larvae were alive, but all the others and the pupae were dead. After five hours only a few first stage larvae were alive. The larvae that most easily stick to the ground in desiccation (second and third stages) are those that are most easily asphyxiated.

It is concluded from these experiments that in all rice-growing countries the conditions requisite for the practical application of the sun's rays exist and that only the mature pupae would stand any chance of yielding adults, the young pupae and all the larvae being killed. This was further demonstrated in the course of some experiments made in 1920 at the Agricultural Experiment Station at Sadova, South Bulgaria. Exposure to the sun of one or two days suffices to kill all the larvae. It is not necessary to dry the rice field completely. The larvae are not carried out by the outflow. In a drained field larvae occur in pools, such as are found in badly levelled ground. In pools that dry up before water is readmitted all the larvae die. In pools with a depth of 2–2½ in. all are killed except the youngest, and these are destroyed if the field is again drained after about a fortnight. It is only in pools about 4 in. deep that the larvae can survive.

To test these conclusions an experiment was made with two neighbouring rice field areas of 300 sq. metres each, one being used as a control. Care was taken to empty the large pools in the experimental area when draining. After 48 hours water was readmitted through sieves preventing the entrance of new larvae. A similar portion of each area was then skimmed with a sieve, when 93 larvae (or 15–16 per sq. metre) were taken in the control area and not a single specimen in the one treated. This work was done in July, and to ascertain its value in spring and autumn it was repeated in September in rainy weather. Only one quite young larva of *Anopheles* and three of *Culex* were found in the treated area.

To ensure rapid draining, groups of fields supplied from one canal should be drained simultaneously. Stopping and readmitting water is best done in the evening. The following plan is suggested for Southern Europe: one five-day draining in April; two four-day drainings in May and two in June; two three-day drainings in July and two in August; and two four-day drainings in September. As larval development requires about a month, each individual is thus

exposed twice to the rays of the sun. Windless days are best. Postponement of draining owing to cool weather is not detrimental, as the cold prolongs larval development. The irrigation channels should also be emptied from time to time. This method is advised against *A. maculipennis* and *A.* (*Myzorhynchus*) *hyrcanus*, Pall. (*pseudopictus*, Grassi).

HEROLD (W.). **Beobachtungen en zwei Feinden der Stubenfliege: *Mellinus arvensis*, L., und *Vespa germanica*, Fabr.** [Observations on two Enemies of the House-fly.]—*Zeitschr. angew. Ent., Berlin*, viii, no. 2, May 1922, p. 459.

The wasps, *Mellinus arvensis*, L., and *Vespa germanica*, F., are recorded as preying on *Musca domestica*.

PATTON (W. S.). **Note on the Occurrence of the Larvae of *Philaematomyia crassirostris*, Stein, in the Human Intestine.**—*Indian Jl. Med. Res., Calcutta*, x, no. 1, July 1922, pp. 57–59.

Musca (*Philaematomyia*) *crassirostris*, Stein, only breeds in fresh cow-dung. The occurrence of the larvae in the human intestine here recorded is therefore thought to be the result of the observance of the Hindoo ceremony of purification, at which the five products of the cow, including a small quantity of fresh cow-dung, are mixed together and eaten. It is quite conceivable that a mass of eggs or some of the first stage larvae may have been ingested in this way.

PATTON (W. S.). **Notes on two Cases of Cutaneous Myiasis caused by the Larva of *Sarcophaga* sp.?**—*Indian Jl. Med. Res., Calcutta*, x, no. 1, July 1922, pp. 60–62, 1 fig.

The species of *Sarcophaga* concerned in the two cases of cutaneous myiasis in man recorded here could not be identified, as only preserved larvae were available for examination. The importance of breeding any such larvae to the adult stage is pointed out. For this purpose the larvae should be placed in some meat and wrapped up in many layers of paper. The puparia should be placed in a test tube, and the adults, especially the males, should be carefully pinned with their puparia.

PATTON (W. S.). **Note on the Egg-laying Habits of *Cobboldia elephantis*, Cobbold.**—*Indian Jl. Med. Res., Calcutta*, x, no. 1, July 1922, pp. 63–65, 1 fig.

Very little is known of the life-history and habits of *Cobboldia elephantis*, Cobbold (Indian elephant stomach bot), a serious pest of elephants in India. Egg masses have been taken from the lower surface of the tusks close to the lips; in the case of young animals and those without tusks, they are probably deposited at the base of the trunk in the neighbourhood of the mouth. The eggs apparently only hatch when they are moistened, and this under natural conditions probably occurs when the animals are drinking or by means of the saliva.

The need for further investigations along these lines is pointed out, as with an accurate knowledge of the egg-laying habits of this fly there should be every possibility of destroying the eggs before they hatch.

Patton (W. S.). **Note on the Value of a tame Cow for collecting the Blood-sucking Diptera of a Locality.**—*Indian Jl. Med. Res., Calcutta*, x, no. 1, July 1922, pp. 66–68.

The value of a tame cow for collecting the blood-sucking Diptera of any locality is pointed out. It is essential, however, that the animal be really tame, otherwise it will not allow a test tube to be placed on its skin, and it resents a net being brushed against its body. A list is given of the Diptera collected at Coonoor on a tame bull: these include *Culicoides* spp., a Simuliid, mosquitos, Tabanids and blood-sucking Muscids.

Patton (W. S.). **New Indian Species of the Genus** *Musca*.—*Indian Jl. Med. Res., Calcutta*, x, no. 1, July 1922, pp. 69–77.

This paper forms the first of a series on the comparative study of the species of *Musca*, in which all the Indian species will be described and illustrated.

X

Those here dealt with are: *Musca prashadi*, sp.n., taken on cattle and horses in Kashmir; *M. incerta*, sp.n., bred from larvae collected from heaps of undigested vegetable matter in slaughter-houses in Madras; *M. senior-whitei*, sp.n., taken on cattle in the Madras Presidency, which is a blood-sucker belonging to the group of species formerly placed in the genus *Philaematomyia*; *M. villeneuvei*, sp.n., bred from elephant dung in South India; and *M. craggi* taken on cattle and buffalos in South India.

Cragg (F. W.). **Relapsing Fever in the United Provinces of Agra and Oudh.**—*Indian Jl. Med. Res., Calcutta*, x, no. 1, July 1922, pp. 78–189, 13 tables, 17 charts, 5 maps.

The first part of this paper deals with the history of relapsing fever in the United Provinces, the distribution and severity of the 1917–20 epidemic, some of the factors in the epidemiology of the disease, and their application in the further study of the recent epidemic and in the examination of the statistics of previous years.

In the second part, the etiology and epidemiology are dealt with in detail, including transmission by *Pediculus* [*cf. R.A.E.*, B, x, 138, 142]. A chapter is also devoted to the subject of delousing clothing and bedding by exposure to the sun. As a result of experiments, however, this method is not recommended unless none of the proved methods are practicable.

The louse can resist the powerful sun in the middle of May at Agra if protected with a single layer of coarse cotton cloth. Should this method be used, all articles must be spread out on the hottest surface available, and turned over at frequent intervals during the day. The process should be repeated at intervals of a few days to kill the larvae that hatch from the uninjured eggs.

Sinton (J. A.). **A Case of Malaria due to** *Plasmodium tenue* **(Stephens).**—*Indian Jl. Med. Res., Calcutta*, x, no. 1, July 1922, pp. 215–235, 2 plates, 1 fig.

Five cases of malaria in which *Plasmodium tenue* was observed are recorded, and a description is given of the various forms of the parasite found in one of them with the developmental cycle, differential diagnosis and the arguments raised against the specific character of this

organism. From the data given it would appear that *P. tenue* is distinct from *P. praecox* (*falciparum*), though a further examination of the latter is suggested in view of the possibility of a "*tenue*" stage hitherto undescribed existing in that parasite. Whether *P. tenue*, Stephens, is synonymous with *P. immaculatum*, Grassi & Feletti, also requires further investigation.

ADIE (H. A.). **A Note on Bodies observed in** *Cimex rotundatus*, **Linné, collected in a Kala-azar infected area in Assam.**—*Indian Jl. Med. Res., Calcutta*, x, no. 1, July 1922, pp. 236–238, 1 plate.

The bodies observed in *Cimex hemiptera* (*rotundatus*) [*R.A.E.*, B, x, 72] are described. They are small and oval, varying in size, shape and nuclear structure. Flagellated forms were not observed. In order to discover the exact stage in the vertebrate host capable of completing development in the bug, it will be necessary to obtain material from a case not under treatment and showing a good infection in the peripheral blood. Batches of bugs must be fed on this material until infection is produced.

EDWARDS (F. W.). **A Synopsis of Adult Oriental Culicine (including Megarhinine and Sabethine) Mosquitoes. Part I.**—*Indian Jl. Med. Res., Calcutta*, x, no. 1, July 1922, pp. 249–293, 3 plates.

The present paper includes keys to the Culicine genera and to the Oriental species of *Aëdes*, *Lutzia* and *Culex*, while the second part will contain synoptic tables and notes on the remaining genera and the synonymic list of Oriental Culicines, with a summary of their distribution.

The species here dealt with are: *Aëdes* (*Finlaya*) *khazani*, sp.n., from S.W. India; *A.* (*F.*) *unicinctus*, sp.n., *A.* (*F.*) *inquinatus*, sp.n., *A.* (*F.*) *christophersi*, sp.n., and *A.* (*F.*) *auronitens*, sp.n., reared from larvae in tree-holes at Simla; *A.* (*F.*) *subniveus*, sp.n., from Sarawak; *A.* (*F.*) *mikiranus*, sp.n., from Mikir Hills; *A.* (*F.*) *simlensis*, sp.n., and *A.* (*F.*) *suffusus*, sp.n., reared from larvae in tree-holes at Simla; *A.* (*F.*) *pallirostris*, sp.n., from Golaghat; *A.* (*F.*) *banksi*, sp.n., from the Philippine Islands and doubtless the Philippine representative of *A. pseudotaeniatus*, Giles, which is confined to Northern India; *A.* (*F.*) *macdougalli*, sp.n., from Ceylon; *A.* (*Ecculex*) *culicinus*, sp.n., from Delhi; *A.* (*Skusea*) *reginae*, sp.n., reared from larvae in tree-holes in Ceylon, previously determined by the author as *A. micropterus*, Giles, of which it may indeed only represent a variety; *A.* (*S.*) *cancricomes*, sp.n., breeding in crab-holes in the Andaman Islands; *A.* (*Aëdes*) *andamanensis*, sp.n., from the Andamans; *A. pulverulentus*, sp.n., from N.W. India; *Lutzia raptor*, sp.n., from N. India; *L. fuscana*, Wied., which is the common Oriental species treated by Theobald as *Culex unicolor*, R.-D.; *Culex bitaeniorhynchus*, Giles, of which there are many variations; *C. cornutus*, sp.n., from Bombay district; *C. mimeticus*, Noë, of which numerous specimens from Formosa, Malaya and India are provisionally regarded as varieties; *C. barraudi*, sp.n., from N.W. India; *C.* (*Acalleomyia*) *obscurus*, Leic.; *C. castrensis*, sp.n., the description of which is based on specimens labelled by Theobald as the types of *Aëdes nigrescens* (this name is not only preoccupied by *Culex* (*Danielsia*) *nigrescens*, Theo., but the male figured under it is an example of *C. malayi*, Leic.); *C. khazani*, sp.n., reared from tree-holes in S.W. India; *C.* (*Lophoceratomyia*) *infantulus*, sp.n., from

Hong Kong, previously determined as a variety of *C. minutissimus*; *Megarhinus albipes*, sp.n., reared from hollow trees at Simla; *Uranotaenia rutherfordi*, sp.n., from Ceylon; *U. roperi*, sp.n., from Borneo; *Topomyia trifida*, sp.n., from Borneo, previously recorded as *T. rubithoracis*; *T. tenuis*, sp.n., from Malay Peninsula; *Heizmannia himalayensis*, sp.n., breeding in a hollow tree-trunk, N. India; *H. chandi*, sp.n., reared from tree-holes, S.W. India; *Haemagogus discrepans*, sp.n., from S.W. India; and *Armigeres maximus*, sp.n., from Sumatra.

Further examination shows *Culex hensemaeon*, Dyar, to be only an aberration of *C. fatigans*, Wied.

The author considers that his previous use of the name *Micraëdes* to include all species of *Culex* with short male palpi, has little justification.

Culex (*Lophoceratomyia*) *fulleri*, Ludl., previously treated as a synonym of *C. rubithoracis*, Leic., is now considered to be distinct.

Dale (J.). **Flies on a Sanitary Site and Typhoid in a Boys' Home.**—*Med. Jl. Australia, Sydney*, 9th Year, i, no. 25, 24th June 1922, pp. 694–695.

In 1920 a large quantity of flies were found emerging from a sanitary site; they were nearly all *Musca domestica*, with a few blow-flies. The occupants of a boys' home near the site had been plagued with flies, and 22 cases of enteric fever had been notified. It is probable that large numbers of flies could be destroyed on such sites by a bait of 10 gm. sodium arsenite and 100 gm. of molasses in a litre of water, the solution being sprayed on to boughs of evergreen trees or other impervious surfaces. This bait has disadvantages owing to its poisonous nature, but the scarcity of flies in mining localities where arsenic is liberated into the atmosphere is notable.

Bruce (E. A.). **Tick Paralysis in British Columbia.**—*Canada Dept. Agric. Health of Animals Branch, Ottawa*, Bull. 28, 1920, 4 pp., 1 plate. [Received 8th August 1922.]

Dermacentor venustus is found over the greater part of South-Eastern, and occasionally in South-Western, British Columbia. The female may under certain conditions cause paralysis sometimes followed by death in man and animals, chiefly children and sheep. The life-history is given.

The disease in sheep is seen in the early spring, usually in dry and warm localities. Animals that recover apparently develop an immunity. When only a few are affected, hand-picking of the large female ticks from the head, neck and back is recommended. If a large number are infested, and if the weather permits, a dip containing arsenic should be used.

The commonest tick on cattle and horses is *D. albipictus*, the life-history of which has already been noticed [*R.A.E.*, B, vii, 2]. An arsenical dip is effective, and greasy preparations, such as 10 oz. kerosene, 10 oz. lard, 2 oz. pine tar and 1 oz. sulphur; or $\frac{1}{2}$ pint kerosene, $\frac{1}{2}$ pint linseed oil and 1 oz. sulphur, will kill these ticks.

In man paralysis is confined to the nerves governing movement and does not affect the special senses. Ticks may be found on the nape of the neck, in the hair and on the back and chest. In removing them care should be taken not to leave their heads in the skin. Covering them with kerosene, petrol, oil of turpentine, or carbolised vaseline, or the application of the hot end of a cigarette will make them loose their hold.

Attempts should be made to destroy the small mammals that serve as hosts. Ground squirrels may be poisoned with 1 oz. saccharine and 1 oz. bicarbonate of soda dissolved in 4 qts. water, with the addition of ½ lb. gloss starch, the mixture being heated until it is thick and stirred all the time ; 1 oz. powdered strychnine should then be added and the mixture poured over 12 qts. of whole oats or 8 qts. crushed oats, so as to cover all the grain. A teaspoonful should be placed in each hole, preferably on clean hard ground.

MOTE (D. C.). **Some Pests of Ohio Sheep.**—*Ohio Agric. Expt. Sta., Wooster*, Bull. 356, February 1922, pp. 53–79, 17 figs., 2 tables.

This is a popular account of parasites of sheep in Ohio, together with their life-histories, the injury they cause and remedial measures. The insects concerned are *Oestrus ovis*, L. (sheep bot-fly), *Lucilia sericata*, Meig. (green-bottle fly), *Phormia regina*, Meig. (black blow-fly), *Melophagus ovinus*, L. (sheep tick), *Trichodectes sphaerocephalus*, Nitzsch (red-headed sheep louse), *Haematopinus pedalis*, Osborn (sheep foot louse), and *Psoroptes communis*, Fürst., var. *ovis*, Hering (common scab mite). *Trichodectes climax* and *T. limbatus* are common on goats, though they are not found on sheep. Notes are given on such dips as coal-tar creosote, cresol, nicotine and lime-sulphur.

HABER (V. R.). **Cockroach Pests in Minnesota with special reference to the German Cockroach.**—*Minnesota Agric. Expt. Sta., Univ. Farm, St. Paul, Minn.*, Bull. 186, August 1919, 16 pp., 7 figs. [Received 9th August 1922.]

A popular account is given of cockroaches and their habits in dwellings, and various traps and remedies for their suppression are described [*R.A.E.*, B, v, 58 ; ix, 99]. The species dealt with are *Blattella germanica, Blatta orientalis, Periplaneta americana* and *P. australasiae.*

HALPIN (J. G.) & HAYES (J. B.). **Fight Poultry Lice and Mites.**—*Wisconsin Coll. Agric., Exten. Serv., Madison*, Circ. 56, revd. April 1922, 8 pp., 3 figs.

This is a popular account of lice and mites on poultry. A sodium fluoride dip, dusting and grease will all destroy these parasites, and spraying with whitewash, kerosene, crude oil or coal tar is also recommended. The commonest species are the louse, *Menopon pallidum*, Nitzsch, and the mite, *Dermanyssus gallinae*, DeG.

BRUCE (E. A.). **Fatalities in Cattle due to the Tick,** *Dermacentor venustus.*—*Jl. Amer. Vet. Med. Assoc., Washington, D.C.*, lxi, N.S. xiv, no. 5, August 1922, pp. 537–539.

Two fatal cases of paralysis of cattle due to *Dermacentor venustus* are recorded. Though this tick is the commonest species on cattle, with the exception of *D. albipictus*, no records have previously been made as to its causing injury to these animals.

LUTZ (A.). **Zoologia Medica—Nematoceros Hematophagos não pertencendo aos Culicideos.** [Blood-sucking Nematocera other than Culicids.]—*A Folha Medica, Rio de Janeiro*, iii, no. 12, 15th June 1922, pp. 89–92.

This paper contains notes on the classification and biology of Psychodid, Ceratopogonine and Simuliid flies, with particulars of the characters of these families and descriptions of some of the species.

Two Psychodids that occur in the State of Rio de Janeiro and are common in fowl-houses are *Phlebotomus papatasii*, Scop., and *P. troglodytes*, Lutz, which may be identical with *P. brumpti*, Larousse. *P. walkeri*, Newst., was described from Brazil and Bolivia, and other South American species are *P. verrucarum*, Towns., from Peru, *P. migonei*, França, from Paraguay, and *P. tejerae*, Larousse, from Venezuela, while *P. atroclavatus*, Knab, occurs in Trinidad.

Some 18 species of Simuliids occur in Brazil, the majority of which are serious pests of domestic animals. They include *Simulium pertinax*, Kollar (the only species that is a pest in Rio de Janeiro), *S. amazonicum*, Goeldi, *S. pruinosum*, Lutz, and *S. simplicicolor*, Lutz.

VAN THIEL (P. H.). ***Anopheles* en Malaria in Leiden en naaste Omgeving.** [*Anopheles* and Malaria in Leyden and its immediate Neighbourhood.]—*Tijdschr. Vergelijk. Geneesk., Leyden*, vii, no. 4, 5th August 1922, pp. 216–225.

Malaria is rare in Leyden. The only Anopheline of importance is *Anopheles maculipennis*. One specimen each of *A. bifurcatus* and *A. plumbeus* (*nigripes*) was captured. *A. maculipennis* seems to prefer sheds containing pigs to those containing horses, and it is probable that these animals are also preferred to cattle. Stables that are dark and free from draughts are preferred. When hibernating, *A. maculipennis* is generally found on ceilings. The mosquitos that occur in cellars in summer are seldom found there in winter, and this shows that hibernation is not a mere continuance of the summer residence.

In 1921 the first oviposition after hibernation occurred on 26th March. Though clean, clear water is preferred, breeding does occur in more or less dirty water if it has a still surface. Investigations as to whether other factors, such as salt or organic matter, influence Anophelines in choosing ditches with clear water appear to show that salt is not a factor in this respect. These mosquitos seem, however, to be able to distinguish water with a permanganate content of over 21·48.

A comparison is made between Leyden and North Holland as regards malaria and the number of Anophelines. It is not possible to say why the latter are more numerous in North Holland. The reason why malaria is less prevalent at Leyden seems to be connected with the question of its decrease during the past century. It is suggested that *A. maculipennis* was originally an open-air species that changed its habits when dwellings and stables provided shelter and food, and that the modern improvements in these buildings may be one reason for the decrease of malaria at Leyden. It is considered advisable in this connection that pigsties should be built only on the outskirts of towns.

SWELLENGREBEL (N. H.). **Het Overwinteren van *Anopheles maculipennis* in de Omgeving van Amsterdam.** [The Hibernation of *A. maculipennis* in the Neighbourhood of Amsterdam.]—*Tijdschr. Vergelijk. Geneesk., Leyden*, vii, no. 4, 5th August 1922, pp. 297–304, 3 figs.

In the course of an investigation on Anophelines captured in dwellings and stables near Amsterdam, it was found that mosquitos can suck blood throughout the winter, though less often than in summer. The transmission of human malaria to the mosquito thus becomes possible

in winter without a long hibernation of the sporozoites in the salivary glands. Further, the maturation of eggs ceases during the autumn and winter. This suspension of egg production probably removes the necessity for the adults to take wing in the open, with the result that the number of infected mosquitos closely associated with man is increased. The interruption of breeding also has the practical result that the mosquito population indoors (which includes infected individuals) is not diluted by new arrivals.

The correlations between the outdoor temperature and the percentage of gorged females, between the outdoor temperature and the percentage of females with mature eggs, and between the percentage of gorged females and that of females with mature eggs were also studied.

It is not possible to indicate a minimum outdoor temperature at which feeding ceases indoors. In 1920–21 the minimum of engorged females occurred between 11th January and 14th February, while in 1921–22 this period extended from 27th December to 27th February. In general it may be said that with an outdoor temperature under 6° C. [42·8° F.] mosquitos in houses cease to mature eggs, though mosquitos in stables do so, probably because stables are warmer than the bedrooms in which most of the house mosquitos are caught. When the percentage of gorged females falls below 9, maturation of eggs ceases.

That outdoor temperature in itself influences egg production only slightly is proved by the fact that eggs mature in spring with an outdoor temperature of 6°–7° C. [42·8°–44·6° F.], while they do not do so in autumn at 13°–16° C. [55·4°–60·8° F.]. The autumnal development of the fat-body may, perhaps, be the cause of this.

These observations show that at Amsterdam there is no true hibernation (complete inactivity) of *A. maculipennis*, contrary to the habits of the same species in Denmark as described by Wesenberg-Lund.

van Thiel (P. H.). **Aanteekeningen over** *Agamodistomum anophelis*. [Notes on *A. anophelis*.]—*Tijdschr. Vergelijk. Geneesk., Leyden*, vii, no. 4, 5th August 1922, pp. 305–321, 1 plate.

Of examples of *Anopheles maculipennis*, Meig., taken at or around Leyden, 5 per cent. were infected with the Trematode, *Agamodistomum anophelis*, encysted in the body-cavity. This differs from the parasite found by Sinton and Soparkar [*R.A.E.*, B, vi, 2, 130] in other Anophelines, for which the name *A. sintoni* is suggested.

Roger (J.). **La Dyspepsie parasitaire et le Complexus symptomatique lié au Parasitisme gastro-intestinal. Diagnostic et Traitement.**—*Rev. Vét., Toulouse*, lxxiv, nos. 2–3, February–March 1922, pp. 73–85, 153–165.

Causes of intestinal disorders in equines due to the larvae of *Gastrophilus intestinalis* (*equi*), *G. haemorrhoidalis* and *G. veterinus* are discussed ; no specimens of *G. pecorum* were observed. Carbon bisulphide and essence of turpentine were the remedies employed against these parasites.

Bardelli (—). **Gale dermatoryctique sur des Lapins et un Cobaye.**—*La Clinica Veterinaria*, January 1921. (Abstract in *Rev. Vét., Toulouse*, lxxiv, no. 3, March 1922, pp. 184–185.

Mange due to *Cnemidocoptes mutans* was considered to be peculiar to birds, but a case of natural transmission to rabbits and to a guinea-pig

living side by side with infested fowls has been observed. Washing with a 5 per cent. solution of potassium sulphide soon ended the infestation.

Descazeaux (—). **Traitement de l'Habronémose cutanée.**—*Rev. Vét., Toulouse*, lxxiv, no. 8, August 1922, pp. 514–515.

Recent knowledge on *Habronema* and its transmission emphasises the necessity for measures against flies, the usual vectors of this parasite. These include Roubaud's biothermic method, consisting in burying fresh dung in the manure heap so that the heat of fermentation destroys the eggs and larvae. All wounds or sores on animals should be protected against flies, and as desiccation and oily substances are unfavourable to the larva of *Habronema*, either dry dressings or vaseline or lanoline ointments should be used. One containing 2½ per cent. of novarsenobenzol is recommended.

Grassi (B.). **Animali domestici e Malaria. Nuovo Orizzonte nella Lotta antimalarica.** [Domestic Animals and Malaria. A New Horizon in Anti-malarial Work.]—*Ann. d'Igiene, Rome*, xxxii, no. 6, June 1922, pp. 421–512.

This is an enlarged edition of a paper already noticed [*R.A.E.*, B, x, 32] that was ready for the press when Roubaud's work containing information on the differentiation of zootrophic races of *Anopheles maculipennis* (*claviger*) [*R.A.E.*, B, x, 53] appeared. It contains an additional section on the author's views and those of Roubaud, the author considering that differences in the number of " teeth " on the maxilla of *Anopheles maculipennis* are unimportant and have certainly no relation to the intensity or absence of malaria. He refers to various recent papers in support of his view that the problem of the presence of Anophelines without malaria is not the simple one suggested by Roubaud, but one involving many factors.

The results derived from the presence of domestic animals are summed up as follows. It is clear that when Anophelines attack animals the human beings present in the locality escape to that extent, and that stables and pigsties are preferred haunts of the mosquitos. On the other hand, these shelters provide in cool climates the warmth necessary for maturing the malarial parasites in mosquitos that have bitten man, and the number of mosquitos in a given locality is certainly governed by the corresponding foci. In the case of Anophelines being present without malaria, it is possible that the avoidance of man by mosquitos is the only reason involved, but generally other factors are also of importance, especially low temperature at night. The preference of Anophelines for animals is marked even in localities that are very malarious, so that caution must be exercised in estimating the value of this factor in places almost or entirely free from malaria. A decrease in the numbers of mosquitos must also be a factor in at least some localities where they occur without malaria ; the author is convinced that an increase of Anophelines has occurred in places where malaria has reappeared.

It is still necessary to ascertain for certain whether there exist in malarious localities Anophelines that prefer man or animals, and whether Anophelines with preference for a given species of animal exist. Furthermore, it is necessary to find out whether a mosquito that has bitten man continues to feed on the same host or whether

it passes indifferently to other animals. A third point concerns the question whether the majority of Anophelines that have acquired malaria from a human host remain—at the time when the sporozoites have reached the salivary glands—in the same neighbourhood.

The opinion is expressed that animal protection against malaria could only be effective if it was general and not limited to individual families.

MATHESON (R.) & SHANNON (R. C.). **New Mosquito Records and Notes on the Habits of certain Species from Central New York.**—*Ann. Ent. Soc. Amer., Columbus, Ohio,* xv, no. 2, June 1922, pp.157–163.

Theobaldia (*Culicella*) *dyari*, Coq., is recorded from a small open shelter erected near a deep pool in swampy land. Large numbers of adults were taken during June and July, but on 4th September none were found. According to Dyar, this species probably lays eggs singly during the summer, and they hatch in the following spring with the melting of the snows, there being only one generation a year. The fact that only adults were found in the present collections indicates either late maturing larvae or possibly a second generation. The first gravid females were obtained on 9th July. This mosquito evidently does not bite man. One larva was obtained on 28th April of the following year.

Aëdes canadensis, Theo., is one of the commonest mosquitos about Ithaca. It is generally believed that there is only one generation a year, the overwintering eggs hatching at irregular intervals during the summer. In attempting to secure larvae of *T. dyari*, two artificial pools were made in sphagnum·bogs on 1st July, and in these young larvae of *A. canadensis* were found. On 18th July the larvae found were almost mature. This undoubtedly indicates that eggs were laid during mid-summer and hatched the same season.

Observations were made on three closely-related species of *Aëdes*, all belonging to the group *stimulans* as classified by Dyar. In a pool at an elevation of about 1,300 ft. a number of mature larvae and pupae of *A. stimulans*, Wlk., and *A. excrucians*, Wlk., were collected on 21st April, but no individuals of *A. fitchi*, F. & Y., were found. On 10th May, at the same elevation, another pool of considerable size and depth was found to contain an immense number of larvae and pupae of *A. fitchi*, this being the only species present. These three species were all vicious biters, and were most troublesome during the early spring months and well on into July.

Taeniorhynchus (*Mansonia*) *perturbans*, Wlk., is a mosquito of wide distribution, but has only twice been recorded from New York State. Large numbers were taken on 3rd–5th July on the shores of Lake Ontario, which is surrounded by large swampy areas. This species bites freely in the woodlands during the day and continues its attacks at dark.

Anopheles quadrimaculatus, Say, has always been considered common about Ithaca, but although search was made in many pools, none of this species was found, two adults only being obtained from houses on the heights about a mile from the marshes. No case of malaria was reported from Ithaca in the past season and there have been very few for a number of years. *Anopheles punctipennis*, Say, is undoubtedly the predominating Anopheline and was taken in large numbers wherever collections were made. It was a troublesome biter throughout the season. In the marshes, larvae occurred in numbers in a variety of

pools, and were often found in temporary roadside puddles. In view of the practical disappearance of malaria simultaneously with the reduced incidence of *A. quadrimaculatus*, it is obvious that *A. punctipennis* must be a poor host for the development of the malarial organism in the region in question.

A. walkeri, Theo., is widely distributed in Eastern North America, but there were no previous records of it from New York State. Individuals were taken while biting on 3rd July and again on 5th August 1921. *Wyeomyia smithi*, Coq., is a well-known inhabitant of the pitcher plant (*Sarracenia purpurea*) and is found in numbers on the sphagnum bogs of New York State from June to August, larvae only being found in plants containing an abundance of fluid uncontaminated by decaying insects.

MILLER (D.). **Sheep Maggot-flies. Observations in the Past Season.** —*N.Z. Jl. Agric., Wellington,* xxiv, no. 6, 20th June 1922, pp. 335–336, 2 figs.

The most active blow-flies attacking sheep in New Zealand are *Pollenia stygia* and *Lucilia sericata*. Some doubt had existed as to the occurrence of *Chrysomyia* (*Pycnosoma*) *rufifacies* [*R.A.E.*, B, ix, 168], but recently two adults have been bred, and larvae of *Ophyra analis* were associated in large numbers with them. That the former fly is now attacking sheep is important, as its depredations in Australia are more serious than those of *Pollenia stygia*. The spinose maggots of *Fannia canicularis* and *Pyrellia antennatis* were also found in wool infested by *P. stygia*. These two species and *O. analis* are apparently secondary parasites.

The incidence of wool-blowing is influenced by climate, food and shelter, particularly the former, which has a direct effect on the flies and the food of the sheep. In localities subjected to severe winters or drought during the summer, wool-blowing is usually rare, but under warm and moist conditions the flies increase, and the grass being plentiful, sheep readily become dirty and attract flies. The mortality from maggot-flies is low in New Zealand flocks, owing to the practice of crutching when the flies are active. The annual loss has been estimated at 1 per cent., or 5–10 per cent. when sheep have not been crutched.

Tularaemia.—*Med. Jl. Australia, Sydney,* 9th Year, ii, no. 1, 1st July 1922, pp. 17–19.

The history of tularaemia is reviewed. The various kinds of insects transmitting the disease, and accounts of cases in America have already been noticed [*R.A.E.*, B, ix, 188 ; x, 96, 97, 122]. The disease occurs in America under conditions that obtain very commonly in Australia, and the transmitting insects are all found there too. So far no case has been recognised, but the possibility of its appearance should be borne in mind.

COOLING (L. E.). **On the Larval and Pupal Stages of** *Myzorhynchus bancrofti*, **Giles, 1902.**—*Proc. R. Soc. Queensland, 1921, Brisbane,* xxxiii, 16th January 1922, pp. 166–173, 1 fig.

In May 1921 three larvae and one pupa of *Anopheles* (*Myzorhynchus*) *barbirostris*, Wulp, var. *bancrofti*, Giles, were found in a creek near Brisbane, and these stages of this mosquito are fully described.

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HOWARD (H. H.). **Malarial Relapses.**—*Southern Med. Jl., Birmingham, Ala.*, xv, no. 5, May 1922, pp. 343–347.

In the course of a campaign for the control of malaria by anti-mosquito measures in Mississippi in 1918–20, the author became of opinion that the question of malarial relapses as a factor in continuing a proportion of the malarial incidence rate from season to season has been insufficiently taken into account, and data are given to support this. The value of the work of the entomologist in connection with the control and eradication of Anopheline mosquitos is obvious, but if a large percentage of the malaria each year is the result of infections acquired in previous seasons, relapses will occur whether mosquitos are present or not.

ROY (S. K.) & BOSE (S. C.). **Filariasis at Puri.**—*Ind. Med. Gaz., Calcutta*, lvii, no. 8, August 1922, pp. 281–286, 10 figs.

At Puri about 27·3 per cent. of the population harbour microfilariae in their blood and about 28 per cent. exhibit the clinical manifestations of filariasis. *Culex fatigans* is very prevalent, breeding in roadside drains and cesspits, and about 34 per cent. of this mosquito are infected with microfilariae. The moist atmosphere near the sea may help in the transmission of filariae to fresh human hosts by mosquitos, and the equable climate may also favour their life-cycle in the mosquito. It was observed that with the sudden advent of the cold season the filarial larvae inside the mosquito became sluggish and died.

The prevalent microfilariae have a nocturnal periodicity, and it is rare to find any in the morning blood taken at 6 a.m. The fact that sheathed microfilariae have no powers of locomotion and are mere passengers in the blood stream has to be borne in mind in explaining nocturnal periodicity. These include *Filaria* (*Microfilaria*) *bancrofti*, *F.* (*M.*) *taniguchi* and *F.* (*M.*) *powelli*. *F.* (*M.*) *loa* has a diurnal periodicity. Those microfilariae that have no sheath and are progressively motile may not show any periodicity; they include *F.* (*M.*) *demarquaii*, *F.* (*M.*) *perstans*, and *F.* (*M.*) *philippinensis*. The authors are of opinion that the species prevalent in this case resembled *F. philippinensis* more than *F. bancrofti*. Particulars are given of the physiology of different organs in microfilariae, the developmental stages in the mosquito and the treatment of filariasis.

CRAGG (F. W.). **Remarks on the Typhus Fever of Kumaon, and on the Suggestion that it is transmitted by a Tick.**—*Ind. Med. Gaz., Calcutta*, lvii, no. 8, August 1922, pp. 291–292.

The purpose of this paper is not so much to criticise Megaw's argument in favour of a tick as the transmitter of the typhus-like fever occurring in India [*R.A.E.*, B, ix, 214], as to set out the *prima facie* case against the louse and to suggest that the disease in question is none other than the ordinary louse-borne typhus.

The disease is probably endemic in the Kumaon hills, and although it has not been definitely proved to be louse-borne, there is no reason to suppose the contrary. In substantiation of this theory the inevitable contact of the European population with lice and the possibilities of transmission of the disease by this means are pointed out.

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Nowlin (N.). **Correlation of the Life-cycle of a Parasite with the Metamorphosis of its Host.**—*Jl. Parasit. Urbana, Ill.*, viii, no. 4, June 1922, pp. 153–160, 6 plates.

Schneideria metamorphosa, sp.n., has been found in Kansas in the fly *Sciara coprophila*.

This is the fourth species in this rare genus, and the only one found out of France. The points of difference between this Gregarine and the other species are recorded. The fly commonly occurs on house plants and is found under leaves and in moist earth at the base of trees. The breeding season begins in March and continues at a slow rate all the summer, the maximum being reached in April and early May. The eggs hatch in a week ; the larval stage lasts 11–12 days and the pupal 6 days. The periods vary slightly with different food conditions and temperature. The host has a complete metamorphosis, and the life-cycle of the Gregarine has a remarkable correlation with it. The trophozoite is confined to the larval stage, the conjugating Gregarine to the pupal, and the spore-forming and sporozoite development to the adult. So far as the author knows, such a correlation has not been described for any other parasite. The various stages are described, together with the classification and affinities of the genus *Schneideria*. The author suspects that this adaptation of the life-cycle to fit that of the host is frequent in the Gregarine group and may explain the incompleteness of so many life-histories.

Kobayashi (H.). **Further Notes of the Overwintering of House Flies.**—*Japan Med. World, Tokyo*, ii, no. 7, 15th July 1922, pp. 193–196, 2 tables.

Further observations and experiments on the hibernation of house-flies in Korea are given [*R.A.E.*, B, ix, 180]. The following conclusions are arrived at : *Musca domestica* hibernates in the adult stage, both males and females surviving ; *Muscina stabulans* and *Mesembrina* sp. over-winter in the adult stage, especially the females ; *Fannia canicularis* and *F. scalaris* appear to hibernate in both adult and pupal stages ; *Lucilia* sp. and *Sarcophaga* sp. hibernate exclusively in the pupal stage ; *Calliphora lata* hibernates in the adult stage, and breeding may continue in winter ; *Ophyra nigra* hibernates in the pupal and larval stages ; *Stomoxys calcitrans* hibernates in the pupal stage ; and *Scatophaga stercoraria* and several species of Anthomyiids hibernate in the adult stage.

From over 10,000 puparia collected in February and March, the majority of flies that emerged were *C. lata*, *L. caesar* and *Sarcophaga carnaria* ; no individuals of *Musca domestica* or *Muscina stabulans* made their appearance, showing that hibernation in the pupal stage is very rare in these species.

Lamborn (W. A.). **The Bionomics of some Malayan Anophelines.**—*Bull. Ent. Res., London*, xiii, pt. 2, August 1922, pp. 129–149, 1 fig.

In the course of a long series of breeding experiments in the Federated Malay States, made with a view to studying in specially bred families the validity of certain species of *Anopheles*, numerous data were obtained on the bionomics of many mosquitos. Variations in form, colouring, etc., may have considerable practical importance, for varying forms may be found to constitute distinct species, the one

being a more active carrier of malaria than the other ; and this would explain discrepancies in reports regarding the relative malaria-carrying powers of certain species, their apparent harmlessness in one country or part of it, and their importance in another. The methods used in breeding are described.

Experiments in reproductive capacity gave the average number of eggs laid by a female of *A. hyrcanus*, Pall., as 66, the maximum obtained being 188, while for other species the relative figures were, for *A. hyrcanus* var. *paeditaeniatus*, Leic., 53 and 147 ; for *A. barbirostris*, Wulp, 69 and 293 ; for *A. maculatus*, Theo., 63 and 300 ; for *A. karwari*, James, 53 and 97 ; for *A. vagus*, Dön., 89 and 273 ; for *A. subpictus* var. *malayensis*, Hacker, 68 and 114 ; for *A. ludlowi*, Theo., 65 and 120 ; for *A. aconitus*, Dön., 38 and 117 ; for *A. kochi*, Dön., 40 and 110 ; for *A. fuliginosus*, Giles, 58 and 95 ; and for *A. tessellatus*, Theo., 29 and 49. The ova were generally laid in one batch. Infection of Anophelines with the malaria parasite seemed to have no adverse influence on oviposition.

The results of desiccation on the ova in various stages and for varying lengths of time showed that at a very early stage of incubation the eggs of most species cannot withstand even short periods of drought, an exception being noticed in *A. barbirostris*, which, even in the preliminary stages, could withstand drying for 24–48 hours. In the case of *A. vagus* some of the ova in which incubation must have begun were able to retain their vitality up to 72 hours when dried, and similar results were obtained with *A. fuliginosus*. Desiccation always checked the development of the ova to some extent, in some cases preventing it entirely, and in no instance did hatching take place for a considerable number of hours after the restoration of the eggs to water. In nature, the fact of the eggs having been laid in a selected spot, even in the smallest pool, ensures their having the requisite moist environment until they have attained a degree of development that will enable them to retain their vitality in the event of the drying up of the pool. When moisture becomes insufficient, although the larvae may be ready to hatch, their actual emergence may be delayed without injury for some little time, until conditions have become more favourable to them. Irregularity in hatching under normal conditions, in the case of eggs floating on water, has been found to occur, at any rate in the laboratory. On the other hand, hatching may be practically simultaneous in some batches although the conditions may not be uniform for all the eggs of the batch.

Oviposition was found to take place, in the case of all open-country species, generally between 8 p.m. and 6 a.m. The length of the life-cycle varied considerably, even in the case of larvae bred from ova laid on the same day and kept under the same conditions ; these variations undoubtedly depend, besides irregularity in hatching, upon inequality in the rate of growth of the larvae. A number of instances of such irregularities in the case of families of *A. maculatus* are quoted, as well as instances of *A. fuliginosus* and *A. kochi*. This inequality in hatching and development must go far to ensure the continuance of a particular strain. Larvae when removed from water rapidly succumbed, even in a moist atmosphere, but pupae in the same atmosphere were able to survive without water and complete their metamorphosis within the usual time. The pupae of *Aëdes* (*Stegomyia*) *albopictus*, Skuse, a particularly hardy species, survived for hours, even when thoroughly dry. Pupation generally took place during the night, but in the case of *A. albopictus*, a diurnal species, it usually

occurred by day. Adults emerged as a rule within 36–48 hours, and generally during the night. In the bred families, very nearly equal numbers of the sexes was found in all species.

The nature and use of the caudal hooklets wherewith certain Anopheline larvae attach themselves to objects is discussed [*R.A.E.*, B, ix, 134]. It is known that these organs enable the larvae to maintain their position in fast-running water, and in the case of larvae frequenting stagnant water they may be used to prevent their being driven before the wind, or possibly the species in question bred originally in running water. This habit may have an important bearing; for example, larvae of *Aëdes albopictus* were found to be thriving in a receptacle covered with an incomplete film of oil, from which they kept free, while such species as *Anopheles maculatus*, which has a strong tendency to attach itself to supports (round which globules of oil would tend to accumulate) might well suffer a different fate. Correlated with this habit of attachment is a difference of feeding habit. The dominance of *A. vagus*, which dispenses with supports, may be in some measure due to these characteristics.

The theory that the larvae of Anophelines do not as a rule co-exist with Chironomid larvae is borne out in the case of the small muddy pools in the Malay States, where the latter frequently occur in enormous numbers. It is thought, however, that their influence on Anophelines is only indirect, in that they collect all the floating algae so assiduously, for the purpose of forming their larva cases, that the Anophelines are reduced to starvation. In certain ponds where no Anopheline larvae were found, predacious insects were present in great numbers, particularly Neuroptera and Belostomatids.

AUSTEN (E. E.). **Further Notes on the Tabanidae of Palestine with Descriptions of New Species.**—*Bull. Ent. Res., London*, xiii, pt. 2, August 1922, pp. 151–160, 4 figs.

Since the publication of the author's paper on the Tabanids of Palestine [*R.A.E.*, B, viii, 110], more material has been received from that country. Besides some of those already recorded, the collection includes *Chrysops buxtoni*, sp.n., taken on horses; *Tabanus agnitionalis*, sp.n.; and *T.* (*Ochrops*) *kerteszi*, Szil., the first of this subgenus to be recorded from Palestine.

EDWARDS (F. W.). **On some Malayan and other Species of** *Culicoides*, **with a Note on the genus** *Lasiohelea*.—*Bull. Ent. Res., London*, xiii, pt. 2, August 1922, pp. 161–167, 1 plate.

Culicoides anophelis, sp.n., is described from the Malay Peninsula as attacking various Anopheline mosquitos; it is also recorded from N.W. India, where it attacks *Anopheles maculatus*, and from Sumatra. The midges attach themselves to the abdomen of the host, evidently for the purpose of obtaining the ingested blood. According to Dr. Lamborn a tube containing the midge after it had fed on the host mosquito was inverted over a bowl containing liquid mud, at the edge of which about 67 ova were found two days later; after another seven days (23rd March) five pupae were found on the surface film of water and three more on 25th March, each of which produced an imago on the third and fourth day. Other new species described are *C. arenarius*, from British Somaliland, and *C. loughnani* and *C. loughnani* var. *jamaicensis*, n., from Jamaica.

The species of which the synonymy is discussed include *C. guttifer*, de Meij., with which the author considers *C. leucostictus*, Kieff., from the Seychelles, to be identical, while the European *C. pictipennis*, Winn., is extremely similar. *C. maculithorax*, Will., from Jamaica is apparently identical with the Indian and Malayan *C. oxystoma*, Kieff.

Notes are given on the genus *Lasiohelea*, Kieff., which should replace Lutz's *Centrorhynchus*. Besides *L. stylifer*, Lutz, of South America, and *L. velox*, Winn. (*pilosipennis*, Kieff.) of Europe, *Forcipomyia lefanui*, Carter, from the Gold Coast, and *Ceratopogon stimulans*, de Meij., from Sumatra, may be referred to this genus.

It would seem that *Lasiohelea*, *Leptoconops* (*sens. lat.*) and *Culicoides* are the only three genera of the CERATOPOGONINAE whose members are mostly or all habitual blood-suckers. The species recorded as *Johannseniella fulvithorax*, Aust., taken in the act of biting, has been recently shown by Carter to be really a *Culicoides*.

BUXTON (P. A.). **On Fish and Mosquitos in Palestine.**—*Bull. Ent. Res., London*, xiii, pt. 2, August 1922, pp. 203–204.

The drainage of certain large areas of marsh and a series of swamps in Palestine cannot be at present attempted, owing to the inadequacy of the financial resources of the country. In this connection a study of the native fish has been undertaken, the results of which are discouraging though interesting. The contents of the gut of *Mugil* sp., *Tilapia zillii*, and *Cyprinodon* spp. were examined, but in no case were Culicid larvae found in the dissected fish. *Cyprinodon* appears to be almost omnivorous, and this and its variety of methods of taking food are points in its favour, as owing to them it is probably able to exist in spite of changing conditions ; it is also apparently resistant to considerable changes in salinity.

Field observations have been more encouraging. Although *Aëdes* (*Ochlerotatus*) *caspius* was found breeding in profusion in isolated cattle footprints near a marsh, where these were connected with the main body of the marsh by water, no larvae were found ; they were also absent from the shallows of the marsh itself, probably owing to the abundance of *Cyprinodon calaritanus* and *Tilapia zillii* in all shallow places. The larvae of *Culex perexiguus* were also markedly confined to small collections of water to which fish had no access, and although larvae of *Anopheles hyrcanus* (*sinensis*) were numerous in patches of green algae that appeared to protect them from *Cyprinodon*, Culicine larvae were never found in the larger bodies of water.

RIVERA (A.). **Enfermedades de la Piel en el Ganado.** [Affections of the Hide of Live Stock.]—*Porto Rico Insular Expt. Sta., Rio Piedras*, Circ. 68, April 1922, 9 pp. [Received 23rd August 1922.]

This is a list of the various parasites that occur on the skin of cattle, pigs, sheep and goats. Particulars of the symptoms and remedies for them are given. They include the tick, *Ixodes ricinus*, and various mites causing mange.

MARTINI (E.). **Bemerkungen zu einigen neueren Mückenarbeiten, welche auch für die deutsche Fauna wichtig sind.** [Remarks on some recent Works on Mosquitos, also important for the German Fauna.]—*Ent. Mitt., Berlin*, xi, no. 4, 15th August 1922, pp. 158–166.

Since the publication in 1920 of the author's paper on European mosquitos [*R.A.E.*, B, ix, 35], several important works on this subject

have appeared, and a further criticism on the nomenclature adopted *R.A.E.*, B, x, 149] is offered. In his opinion attempts to distinguish species by colour differences in the adults are not justifiable. Such a distinction is permissible only where the new form is manifestly different from known species, even assuming marked variation in the latter. Otherwise specific differentiation should be based only on the male genitalia and the larvae. The sexes should only be associated if pairs are taken or if breeding from the same batch of larvae has been carried out. The difficulty of the exact determination of the females is such that geographical data based on this sex alone are seldom permissible.

The identity of several mosquitos is discussed on these lines.

DIFFLOTH (P.). **Les Parasites externes des Moutons.**—*La Vie Agric. & Rur., Paris*, xxi, no. 34, 26th August 1922, pp. 146–149, 7 figs.

This article describes the better known external parasites of sheep and the measures usually adopted against them.

DE MELLO (F.) & GUIMARAIS (A.). **Constatation dans le Sang des Exanthématiques de nombreux Microorganismes ressemblant à des** *Rickettsia prowazeki.*—*C.R. Soc. Biol., Paris*, lxxxvii, no. 27, 22nd July 1922, pp. 707–709.

Micro-organisms resembling *Rickettsia prowazeki* were found in the blood of 12 out of 18 cases of typhus.

DE SOUSA (J.). **Présence de** *Rickettsia prowazeki* **dans le Sang des Convalescents de Typhus exanthématique.**—*C.R. Soc. Biol., Paris*, lxxxvii, no. 27, 22nd July 1922, pp. 710–711.

The blood of some 75 per cent. of convalescent typhus patients harboured *Rickettsia prowazeki* for two or three days (in one instance for seven days) following the absence of fever.

GUIMARAIS (A.). **Flore microbienne du** *Phthirius inguinalis* ; **Remarque sur des Eléments de Nature rickettsienne.**—*C.R. Soc. Biol., Paris*, lxxxvii, no. 27, 22nd July 1922, pp. 711–713.

The intestinal contents of *Phthirus pubis* (*inguinalis*) taken from healthy persons in a district of Portugal free from typhus (of which this louse is not incriminated as a vector) contained quite typical Rickettsian forms.

GEDOELST (L.). **A propos de la Larve de** *Gasterophilus pecorum*, **F.**—*Ann. Soc. Ent. France, Paris*, xc (1921), pt. 3–4, 1922, pp. 245–254, 2 figs.

A re-examination of the type of *Gastrophilus* (*Gasterophilus*) *pecorum*, F., at Vienna, shows Brauer's description of it to be inadequate, and a redescription is therefore given. From this it would appear that the species of *Gastrophilus* recorded by Brauer in 1896 and Sjöstedt in 1908 from *Equus böhmi* as well as *G. pecorum* var. *zebrae*, Rodhain & Bequaert [*R.A.E.*, B, ix, 44] are identical with *G. pecorum*, F.

A description is also given of a second stage larva of *G. pecorum* from South Africa, showing under the cuticle the spinulation characteristic of the third stage.

BRUG (S. L.). **Extract uit het Jaarverslag van het Centraal Militair Geneeskundig Laboratorium over het Jaar 1921.** [An Extract from the Annual Report for 1921 of the Central Military Medical Laboratory.]—*Geneesk. Tijdschr. Ned.-Indië, Batavia,* lxii, no. 3, 1922, pp. 332–354.

The localities where Anophelines were found, both in 1921 and in 1920, are shown in a table. The occurrence of *Anopheles subpictus* (*Myzomyia rossi*) in Sumatra and Nias is noteworthy. At Weltevreden *Armigeres* (*Desvoidya*) *obturbans* has peculiar habits. The females bite at about 6–6.30 p.m., and then disappear almost entirely about an hour later. At other hours they very seldom attack man.

A fly, *Sarcophaga* sp., was bred from larvae from the ear of a sufferer from external otitis due to burns.

ARUCH (E.). **Cura della Rogna demodectica del Cane.** [The Cure of Demodectic Mange in the Dog.]—*La Clinica Vet., Milan,* xlv, no. 9, 1st–15th July 1922, pp. 333–334.

Canine demodectic mange, which occurs in many parts of Italy, is difficult to cure owing to the protected position of the parasite, *Demodex*. The following method is recommended as giving excellent results. The coat must be brushed and thoroughly washed daily with tepid water, soap and creolin. The dried coat must be rubbed with cotton wool soaked in ether, and this must be followed by a second rubbing with ether containing 1–2 per cent. of iodine. Thymol, 0·25 per cent., or salicylic acid, 1 per cent., may be substituted for the iodine, but the latter is preferable. If the entire body is affected, it should be divided into three, four or even five areas for consecutive treatment, so as to minimise the chilling action of the ether.

TÄNZER (E.). **Morphogenetische Untersuchungen und Beobachtungen an Culiciden-Larven. I. Teil. Morphogenetische Beobachtungen.** [Observations on the Morphology of Culicid Larvae.]—*Arch. Naturgesch., Berlin,* lxxxvii, Ser. A, pt. 7, June 1921, pp. 136–714, 27 figs.

The points of difference in the anatomy of the larvae of *Anopheles bifurcatus*, *Theobaldia annulata* and *Culex pipiens* are indicated, and the tracheal system of various species is dealt with.

OSTERWALD (H.) & TÄNZER (E.). **Morphogenetische Untersuchungen und Beobachtungen an Culiciden-Larven. II. Teil. Beobachtungen während der Submersion.** [Observations on Culicid Larvae during Submersion.]—*Arch. Naturgesch., Berlin,* lxxxvii, Ser. A, pt. 7, June 1921, pp. 175–182.

In *Mochlonyx* skin and tracheal respiration are complementary to each other, and though neither form is able to supply the necessary amount of oxygen alone, yet up to a certain point they can replace each other. The observations on *Culex*, *Anopheles* and *Theobaldia* confirm the statements made by Koch [*R.A.E.*, B, vii, 49].

Buschkiel. (M.). *Caulleryella pipientis* **n. sp. Eine neue Schizogregarine aus den Larven der** *Culex pipiens.*—*Zool. Jahrbücher, Jena,* Abt. Anat. & Ontogenie, xliii, pt. 1, 1921, pp. 96–178, 2 plates, 11 figs.

A new Schizogregarine, *Caulleryella pipientis,* is recorded from the gut of the larvae of *Culex pipiens,* and a detailed account is given of its various stages.

Vogel (R.). **Zur Kenntnis des Baues und der Funktion des Stachels und des Vorderdarmes der Kleiderlaus** (*Pediculus vestimenti,* **Nitzsch).** [On the Knowledge of the Structure and Function of the Proboscis and the Foregut of *P. humanus,* L.]—*Zool. Jahrbücher, Jena,* Abt. Anat. & Ontogenie, xlii, pt. 2, 1921, pp. 229–258, 3 plates, 4 figs.

The contents of this paper on the anatomy of *Pediculus humanus,* L. (*vestimenti,* Nitzsch) are indicated by its title.

Vogel (R.). **Kritische und ergänzende Mitteilungen zur Anatomie des Stechapparats der Culiciden und Tabaniden.** [Critical and Additional Information on the Anatomy of the Mouth-parts of Culicids and Tabanids.]—*Zool. Jahrbücher, Jena,* Abt. Anat & Ontogenie, xlii, pt. 2, 1921, pp. 259–282, 1 plate, 10 figs.

The contents of this paper are indicated by its title.

Walter (E.). **Beiträge zur Kenntnis der Larven von** *Hypoderma* **und** *Gastrus.* [Contribution to the Knowledge of the Larvae of *Hypoderma* and *Gastrophilus.*]—*Zool. Jahrbücher, Jena,* Abt. System. Geogr. & Biol. der Tiere, xlv, pt. 6, 1922, pp. 587–608, 2 plates, 1 fig.

The three stages of the larvae of *Hypoderma diana* taken on deer in Germany are described and compared with those of *H. actaeon, H. bovis* and *Gastrophilus intestinalis* (*Gastrus equi*).

During 1920 larvae of a species of *Gastrophilus* were taken from the stomach of a horse; these may prove to be *G. lativentris,* recorded by Brauer from Courland.

Roubaud (E.). **Les Mouches "tsétsés" et les Conditions de l'Elevage en Afrique Occidentale Française.**—*Agron. Colon., Paris,* nos. 55 & 56, July & August 1922, pp. 217–223 & 254–262, 2 plates, 5 figs., 1 map.

In French West Africa the rearing of cattle, which is one of the most important industries of the country, is closely correlated with the occurrence of *Glossina* spp., the vectors of trypanosomiasis. A general account of the species found in the country is given, with a study of their distribution and a discussion of the influence of climate and vegetation on their incidence [*R.A.E.*, B, x, 117]. The most noticeable feature of their distribution is the limitation of their occurrence to humid situations. The excessively dry winds, blowing from the Sahara, are felt in the forest belts to the north in the dry season, causing migrations of *Glossina* and rendering the region more or less safe for herds, whilst further south, where the desert winds are not felt, the keeping of domestic animals is seriously affected.

The map shows that the zones that produce the great herds of animals raised for export only occupy one-fifth of the area of the country, and are entirely outside the tsetse-fly zones. Moreover, movement of animals is necessary owing to insufficiency of pasture. Within the *Glossina* belts domestic animals exist, but the importance of the herds diminishes to a remarkable degree towards the coast, while at the same time a tendency towards decrease in size and the production of dwarf races is observable in the native cattle. A study of the principal kinds of domestic animals has shown that of bovines, the large and heavy humped cattle, which are extremely susceptible to trypanosomiasis, occur in the great cattle regions north of the 14th degree of latitude, the southern limit of their occurrence coinciding with the northern limit of *Glossina*. South of this region are races of cattle without humps, but of moderate weight and size; these are thought to be hybrids between the humped animals and the dwarf race. They are somewhat less susceptible to trypanosomiasis than the humped animals, and, in spite of rather high mortality in the winter, the natives manage to keep fairly large herds in the districts where *Glossina* are not very abundant. Winter conditions, which favour the fly, only last a few months in the regions where these races live, and the cattle, pastured at some distance from the water-courses, suffer but little. In the more southern or coast regions, where the humidity is so much greater that *Glossina* are numerous throughout the year, these large races, which are the only ones fit for export, disappear completely and give place to races of small size and rather poor appearance, which live in a half-wild condition. These small animals exhibit great strength, and are frequently used for transport; they possess a natural resistance to trypanosomiasis, and are, in fact, the only domestic animals that can survive in the great zones infested by *G. morsitans*. On parts of the coast and on the borders of the lakes is another small race, half wild, badly kept, and living in extremely humid temperature; these animals, while not very healthy and often tubercular, are very resistant to trypanosomiasis, and if well cared for and imported into other fly-infested regions, might form excellent herds. Two very successful experiments of this nature have already been made.

In the case of horses, much the same conditions obtain; most of the strains are extremely susceptible to trypanosomiasis, but their susceptibility is in direct ratio to their size. It is in mid-Dahomey that a dwarf race is found that is the most resistant, although living in a zone where *Glossina* are abundant and where three forms of animal trypanosomiasis occur. The value of this race and its importance in the production of mules seem to have been overlooked by the natives. Donkeys, although less susceptible than horses, cannot be raised in the true *Glossina* belts, but mules show a much greater degree of immunity. Although the Algerian mules used largely of late years in Senegal and the Sudan die in considerable numbers, the local races seem to be completely immune and remain healthy although attacked by hundreds of flies; unfortunately, the natives seem to have a prejudice against the breeding of mules.

The larger races of goats and sheep, living in the open, show great susceptibility to trypanosomiasis and cannot live in the fly zones beyond the 14th degree; within the fly zones the animals that occur are of a much smaller type and are far less subject to the disease; this, however, is probably due rather to the fact that they live almost entirely within the villages, where they are protected from flies, than

to true immunity. Pigs seem to be the least influenced of all animals by the presence of *Glossina*, but unfortunately they are but little reared, owing to Mohammedan prejudices.

It is obvious that it is on the study and careful selection and distribution of the small, resistant races described above that the future of the cattle-raising industry in tropical and equatorial Africa depends.

Urich (F. W.), Scott (H.) & Waterston (J.). **Note on the Dipterous Bat-parasite,** *Cyclopodia greeffi*, **Karsch, and on a new Species of Hymenopterous (Chalcid) Parasite bred from it.**—*Proc. Zool. Soc., London,* 1922, pt. 2, June 1922, pp. 471–477, 1 fig.

In the introductory remarks by Dr. Scott the existing literature on the occurrence of the bat parasite, *Cyclopodia greeffi*, Karsch, is reviewed It was taken by Mr. Urich in 1920 in San Thomé on the fruit-eating bat (*Eidolon helvum*), and numerous puparia were found on the leaves of the trees where the bats were roosting. Neither larvae nor puparia were found on the animals. Newly emerged adults died after 48 hours, having unsuccessfully attempted to feed when placed on rabbits.

A Hymenopterous parasite bred from two puparia is described by Dr. Waterston as *Eupelmus urichi*, sp. n.

Hildebrand (S. F.). **Top Minnows in Relation to Malaria Control, with Notes on their Habits and Distribution.**—*U.S. Public Health Service, Washington, D.C.*, Public Health Bull. 114, May 1921, 34 pp., 32 figs. [Received 8th September 1922.]

The fish dealt with are *Gambusia affinis, Heterandria formosa, Fundulus notti, F. notatus* and *Mollienesia latipinna*. With the exception of the last named, all these are of more or less value in eradicating mosquito larvae and pupae in the southern United States. The use of *Gambusia affinis* during anti-malaria campaigns in 1920 reduced the cost and added greatly to the permanent nature of the work. An account is given of the distribution and habits of this fish [*cf. R.A.E.*, B, vii, 162 ; ix, 163]. In the case of *G. affinis*, new broods consisting of any number up to 200 are produced at intervals of 3 to 6 weeks throughout the breeding season, which varies according to the duration of the warm weather.

Owing to the limited observations made on *H. formosa* no definite information has been obtained regarding its relative value as an agent for the control of malaria, though it appears to be a serious enemy of immature mosquitos.

The two species of *Fundulus* are probably of very limited importance; they are nowhere found abundantly, and would seem to be difficult to propagate in large numbers, so that it is extremely doubtful whether it would be practicable to use them except under very restricted conditions.

Veenendaal (—). **A propos de la Gale auriculaire du Chien et du Chat.**—*Tijdschrift voor Veeartsenijkunde,* 1st April 1922, p. 252. (Abstract in *Ann. Méd. Vét., Brussels,* lxvii, no. 8–9, August–September 1922, pp. 379–384.)

A general account of auricular mange in dogs and cats is given, the Sarcoptid mite that causes it being found almost invariably in the external auditory meatus and on the internal surface of the ear itself.

The action of anti-parasitic substances is very variable. Volatile and very strong-smelling products, such as ethereal oils, seem to be the most effective. Whether the action of oils and fatty substances is due to their blocking the respiratory organs of the parasite is a disputed point; Bruderlein has demonstrated that the parasites, when placed in liquid paraffin, do not die in less than five days. Males have been found to be more resistant than females, and larvae more so than adults. The eggs are very resistant, owing to their chitinous covering. The immobility produced by these substances is frequently due not only to the toxic nature of the material used but also to its temperature, which is generally lower than that of the environment of the parasite on the skin or in the ear of its host. A reduction of the temperature in any more or less toxic medium will produce torpor in the parasite, and in the case of very volatile liquids it is probably the reduction of temperature brought about by quick evaporation that causes torpor. Raising the temperature will then produce reanimation, which lasts until the true toxic effect begins to cause a fresh torpor. The certainty of death can only be determined if return to favourable conditions produces no reanimation. It was found by Henry that the parasite could live in and even feed upon groundnut oil at a temperature of 86° to 90° F.

The author records the results of experiments with various substances. Creolin proved more effective than lysol, especially when heated. The most successful was a solution of one per cent. liquid carbolic acid in glycerine; this softens the crusts, kills the parasites, and penetrates far into the auditory meatus, to the walls of which it adheres. A few drops should be put in the ear twice daily, the ear being then cleaned with swabs of cotton wool. Otitis can be treated with an alcoholic solution of three per cent. resorcin.

Hoffmann (W. H.). **Sobre la Mosca *Chrysops costatus*, Fabr., con algunas Observaciones sobre la Importancia de las Moscas *Chrysops* como Transmisoras de Enfermedades infecciosas.**—Reprint from *Mem. Soc. Cubana Hist. Nat. Felipe Poey, Habana*, Ses., 23rd February 1922, 3 pp., 1 fig.

This record of *Chrysops costata*, F., attacking man in Cuba has already been noticed [*R.A.E.*, B, ix, 212; x, 136]. This fly has only been observed in Havana in the cold winter months. It bites at all hours of day and night.

Hoffmann (W. H.). **Die Chrysopsfliegen und ihre Bedeutung für den Tropenartz.** [Tabanids of the Genus *Chrysops* and their Importance for the Medical Man in the Tropics.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic*, xxvi, no. 8, August 1922, pp. 244–248, 1 fig.

This paper deals with the part played by these Diptera in the transmission of disease and records an attack by *Chrysops costata*, F. [see above].

Marzinowsky (E. T.). **Das Tropeninstitut zu Moskau.** [The Tropical Diseases Institute in Moscow.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic*, xxvi, no. 7, August 1922, pp. 205–208.

An account is given of the work planned for the Tropical Diseases Institute opened on 1st September 1920 in Moscow.

The entomological section under Dr. T. A. Nikolski will shortly be started and will deal with blood-sucking insects and their control.

SCHIKORA (F.). **Beiträge zur Morphologie von *Sarcoptes equi*, Gerlach.** [Contributions to the Morphology of *S. equi*.]—*Zeitschr. Infekt.-Krankh. d. Haustiere*, xxiii, no. 1–2, 1922. (Abstract in *Deutsche Tierärztl. Wochenschr., Hanover*, xxx, no. 36, 9th September 1922, p. 467.)

In spite of the numerous publications on the subject, there still exists a doubt whether *Sarcoptes* [*scabiei* var.] *hominis* and *S.* [*scabiei* var.] *equi* are specifically distinct or not. In this paper mites taken from a horse and considered to be *equi* because they lack the morphological characters given by Gerlach for *hominis* are fully described and figured, all details in the development being carefully dealt with. The conclusion reached is that the specific relation between these mites must remain unsettled until the developmental stages of *hominis* have been subjected to a similar investigation.

SELLA (M.). **Aspetti generali della Lotta antimalarica.** [The General Aspects of Anti-malarial Work.]—*Il Policlinico*, Sez. Prat., 13th & 20th March 1922. (Abstract in *Ann. d'Igiene, Rome*, xxxii, no. 7, July 1922, pp. 574–579.) [Received 12th September 1922.]

In this paper the various methods of anti-malarial work are compared. In Italy quinine prophylaxis is the chief measure, and the central government is the body almost exclusively responsible for every action ; in the United States local commissions are entrusted with much of the work, the chief feature of which is anti-larval measures. While the value of the work hitherto accomplished in Italy is recognised, the view is taken that the development of decentralisation and of anti-mosquito measures is now required.

PERYASSÚ (A.). **Uma nova Especie de Culicineo Brasileiro.** [A New Brazilian Culicine.]—*A Folha Medica, Rio de Janeiro*, iii, no. 15, 1st August 1922, pp. 117–118.

Taeniorhynchus chrysonotum is described from specimens taken in March and April. It is closely allied to *T. albicosta*, Chagas. This mosquito is diurnal and crepuscular in habit and is a vicious bloodsucker, biting both man and animals.

PERYASSÚ (A.). **Considerações Medico-Sanitarias e Biologicas do Valle do Rio Doce.** [Medico-sanitary and Biological Aspects of the Rio Doce Valley.]—*A Folha Medica, Rio de Janeiro*, iii, nos. 13 & 14, 1st & 15th July 1922, pp. 145–148, 157–164.

In this warm and damp valley in the south of Brazil mosquitos abound, 35 species having been observed. Swarms of *Aëdes* (*Culex*) *scapularis*, Rond., *Taeniorhynchus* (*Mansonia*) *fasciolatus*, Lynch, *T.* (*M.*) *albicosta*, Chagas, and *T.* (*M.*) *chrysonotum*, Peryassú, occur in the forests, although pools and other waters are entirely lacking. These mosquitos seem to breed on the damp ground, which is never reached by sunshine. Malaria is rife in the valley and causes a very heavy mortality, so that anti-malarial measures, at present non-existent, are urgently needed. *Anopheles* (*Cellia*) *tarsimaculatus*, Goeldi, *A.* (*C.*) *argyritarsis*, R.D., and *A.* (*C.*) *albimanus*, Wied., are very numerous on the banks of the Rio Doce and its tributaries and lakes, and are the species responsible for the transmission of the disease. As 14 per cent. of the population are gamete-carriers, repeated

infections occur of a severe mixed type of malaria, chiefly malignant tertian. The measures to be taken are outlined. Besides quinine prophylaxis and the segregation of gamete-carriers, anti-Anopheline work is advised, including the destruction of breeding-places, the introduction of larva-destroying fish (such as *Girardinus caudimaculatus* or *Poecilia januaria*), and the clearing of areas within about 900 yards of townships, such areas to be used for pasturing cattle as an attraction for the mosquitos.

PERYASSÚ (A.). **Os Mosquitos Portadores de Ovos da Mosca do "Berne." (Nota previa.)** [Mosquito Transporters of the Eggs of *Dermatobia hominis*. Preliminary Note.]—*A Folha Medica, Rio de Janeiro*, iii, no. 14, 15th July 1922, p. 105, 1 fig.

The author has found eggs of *Dermatobia hominis*, L., under the abdomen of a mosquito, *Psorophora posticata*, Wied., this being the first observation of the kind in Brazil, though it has been recorded in Venezuela and elsewhere [*cf. R.A.E.*, B, v, 18, etc.].

MELLO LEITÃO (—). **Aranhas peçonhentas do Brasil.** [Poisonous Spiders of Brazil.]—*Chacaras e Quintaes, S. Paulo*, xxvi, no. 2, 15th August 1922, pp. 99–102, 7 figs.

This paper gives a brief account of the various poisonous spiders found in Brazil, where deaths due to them are known to occur occasionally.

BODKIN (G. E.). **[Report of the] Government Economic Biologist.**—*Rept. Dept. Sci. & Agric.* [*Brit. Guiana*], *1920, Georgetown*, 1922, Appx. iii, pp. 55–58.

In a mosquito survey undertaken during the driest time of the year, when breeding-places were reduced to a minimum, Anophelines were found to be breeding almost exclusively in the cane cultivations in proximity to the thickly inhabited parts of the estates, where the small drains provide favourable breeding-places. The species observed included *Aëdes* (*Ochlerotatus*) *scapularis*, Rond., *Culex similis*, Theo., *C. corniger*, Theo., *C. fatigans*, Wied. (*quinquefasciatus*, Say), *Uranotaenia geometrica*, Theo., *Anopheles tarsimaculatus*, Goeldi, *Aedomyia squamipennis*, Arrib., and *Aëdes argenteus*, Poir.

The survey included also a study of the problem of the house-fly (*Musca domestica*, L.). These surveys, if vigorously followed up by the estate authorities by means of the institution of sanitary methods for the elimination of these pests, would result in greatly improved conditions.

DU BUYSSON (H.). **Recherches synonymiques sur** *Argas reflexus*, **Fabr.** (*verus*) **et** *Ixodes marginatus*, **Fabr.** (*verus*).—*Misc. Entomologica, Uzés*, xxvi, no. 7, July 1922, pp. 49–50.

Attention is called to the fact that though the figures of Dugès (1850), Coquebert (1804), and probably also those of Latreille (1806) and Hermann (1804), refer to *Argas reflexus*, F., the subsequent identifications published under this name relate to *A. columbae*, Herm., and the latter name must therefore be used for the Argasid infesting pigeons. The host of the true *A. reflexus*, F., is uncertain, but according to Cabanès it came from the nests of swifts.

It is also pointed out that *Acarus marginatus*, F., must not be referred to *Ixodes columbae*, Herm. (*reflexus*, auct.) but to the male of *Ixodes ricinus*, L.

BRUMPT (E.) & LARROUSSE (F.), **Transmission de la Piroplasmose canine française par le** *Dermacentor venustus*.—*Bull. Soc. Path. Exot., Paris*, xv, no. 7, 12th July 1922, pp. 540–545, 1 fig.

Canine piroplasmosis is of world-wide sporadic occurrence and is transmitted in nature by the ticks, *Haemaphysalis leachi*, *Rhipicephalus sanguineus* and *Dermacentor reticulatus*. Experiments have shown that *Piroplasma canis* is transmitted from an infected tick to its offspring. In the case of any of these vectors, piroplasmosis is transmitted to the dog by an adult female tick that is the offspring of an infected tick, even though the larval and nymphal stages may have been reared on resistant hosts such as the guinea-pig or hedgehog. A large percentage of ticks becomes infected, and there is a prospect of the disease becoming far more extensive, provided that the natural relations between susceptible hosts and the ticks serving as vectors are close enough to ensure the preservation of the pathogenic organisms.

DONATIEN (A.) & PARROT (L.). **Trypanosomiase naturelle du Chien au Sahara. (Note préliminaire.)**—*Bull. Soc. Path. Exot., Paris*, xv, no. 7, 12th July 1922, pp. 549–551.

Natural trypanosomiasis of the dog was first recorded in the Sahara in 1915, when an imported dog was found to be infected with a trypanosome very similar to *Trypanosoma berberum*, the organism causing debab in camels. As this disease is endemic in the region, it was thought to be a case of spontaneous transmission of the trypanosomiasis of camels to the dog. Later, however, an infection of *T. marocanum* in a dog was recorded outside the Sahara [*R.A.E.*, B, viii, 80]. The authors now record a second case of natural trypanosomiasis of the dog in Constantine Sahara. The trypanosome causing the disease is described, and was found pathogenic to mice, rabbits and guinea-pigs. The animal in question was in frequent contact with camels in a region where the disease is often found, and at a time when *Stomoxys* would probably be the vector [*R.A.E.*, B, x, 108].

FRANCHINI (G.). **Particularités de Culture de certains Flagellés. De la Culture des** *Leishmania* **dans le Milieu de Yoshida.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 7, 12th July 1922, pp. 551–555, 2 figs.

This paper records further researches into methods of culture of flagellates and the effects of various culture media on them [*R.A.E.*, B, ix, 150; x, 121]; and demonstrates that kala-azar, Oriental sore, *Herpetomonas tarentolae* and certain flagellates of the digestive tract of insects can successfully be cultivated in Yoshida's medium.

PAVLOVSKY (E. N.) & STEIN (A. R.). **Nouveau Cas de Creeping Disease (Myiasis linearis) en Russie.**—*Bull. Soc. Path. Exot., Paris*, xv, no. 7, 12th July 1922, pp. 555–558.

Many cases of creeping myiasis have been recorded, due to the larva of *Gastrophilus*. The case here recorded in man was peculiar in that the larva, instead of being found in the external layer of the epidermis, had burrowed into the Malpighian layer.

PAVLOVSKY (E.) & STEIN (A.). **Des Causes de l'Apparition des Taches bleues chez l'Homme.**—*Bull. Soc. Path. Exot., Paris,* xv, no. 7, 12th July 1922, pp. 558–560.

Experiments to attempt to determine the cause of the appearance of blue patches on the skin in persons that have been bitten by *Phthirus pubis* are described. Injections of extract from the salivary glands of the louse gave positive results, but this was not the case when extract from the stomach was used.

RODHAIN (J.). **La Subsistance de l'***Ornithodorus moubata* **sur des Reptiles et des Sauriens.**—*Bull. Soc. Path. Exot., Paris,* xv, no. 7, 12th July 1922, pp. 560–564.

Further studies have been made in the rearing of *Ornithodorus moubata* on cold-blooded animals [*R.A.E.*, B, x, 44]. The experiments described show that the blood of lizards, geckos and snakes is digested by this tick practically as easily as that of the guinea-pig; that of the chameleon, however, is digested with difficulty and is toxic, its absorption being followed by a pseudo-lethargic condition, many ticks succumbing after a full meal. Nymphs of *O. moubata* having fed for three successive meals on the snake, *Causus rhombeatus,* developed in 5½ months to practically the same proportions as nymphs of the same age fed on guinea-pigs and rats; young ticks feeding on snakes, however, died in much greater numbers than those engorging on these mammals. Further experiment has shown that *O. moubata* can nevertheless adapt itself to living on chameleon blood, although the ticks occurring in habitations may find it toxic when absorbed for the first time; digestion, however, is always slow and difficult, and individuals fed exclusively on this diet develop slowly. It remains to be discovered whether females reared on chameleons and fertilised by males fed on the same host can produce eggs giving rise to larvae that will survive. The fact that an individual of *O. moubata* nourished exclusively on chameleon from birth up to 16 months can then engorge without difficulty on a mouse proves once more the wide range of hosts of these ticks.

RODHAIN (J.). **L'Ubiquisme parasitaire de l'***Ornithodorus moubata* **peut-il influer sur son Infection par le Spirochète de Dutton?**—*Bull. Soc. Path. Exot., Paris,* xv, no. 7, 12th July 1922, pp. 564–565.

Further experiments with the tick, *Ornithodorus moubata* [see preceding paper] have shown that an adult, reared on a chameleon from its first nymphal stage, becomes infected with spirochetes the first time it feeds on an infected mammal. It is probable that the absorption of chameleon blood by ticks already infected with spirochetes in no way influences the infective power of the ticks. Further experiments are to be made, and these will probably confirm the theory that the wide range of hosts of this tick has no bearing on its rôle as a vector of spirochetes.

ROUBAUD (E.) & DESCAZEAUX (J.). **Evolution de l'***Habronema muscae,* **Carter, chez la Mouche domestique et de l'***H. microstomum,* **Schneider, chez le Stomoxe. (Note préliminaire.)**—*Bull. Soc. Path. Exot., Paris,* xv, no. 7, 12th July 1922, pp. 572–574.

In continuation of the study of the development of *Habronema megastomum* in *Musca domestica* [*R.A.E.*, B, x, 12] the development

of the other species of *Habronema* of the horse (*H. muscae* and *H. microstomum*) has been followed on the same lines, and is described. These three parasites, which develop either in *M. domestica* (*H. megastomum* and *H. muscae*) or in *Stomoxys* (*H. microstomum*), have each an exclusive environment for development; *H. megastomum* is a parasite of the Malpighian tubes, its presence causing the formation of a tumour in the organ on which it feeds, while *H. muscae* and *H. microstomum* are parasites of the cells of the adipose tissue, from which they do not escape until the end of their second stage.

The penetration of the interlabellary membrane of the fly's proboscis is a spontaneous action, depending entirely on the two essential conditions of heat and moisture. Infestation of the horse takes place through the contact of the extremity of the proboscis with the mucous membrane of the lips or with warm, moist wounds on the surface of the skin.

Nikanorov (S. M.). **К Вопросу о Роли Верблюдов в Эпидемиологии Астраханской Чумы.** [On the Question of the Rôle of Camels in the Epidemiology of Plague in Astrachan.]—**Вестник Микробиологии и Эпидемиологии.** [*Herald of Microbiology and Epidemiology*], *Saratov*, i, pt. 2, 1922, pp. 89–128 & 178–179, 16 charts. [With a summary in French.]

As a result of extensive investigations it has been definitely ascertained that in the Kirgiz district camels are an important source of plague infection in man. The method of infection of these animals under natural conditions has not yet been proved, but evidently ground squirrels are of importance in this connection, as they probably contaminate the green fodder. Mice are even a more probable source of danger, as by infecting the hay they create suitable conditions for disseminating the disease by inhalation, this form generally proving fatal.

Boone (R. C. P.). **Piroplasmose Bovine ou Hémoglobinurie infectieuse.** —*Jl. Sta. Agron. Guadeloupe, Pointe-à-Pitre*, ii, nos. 1 & 2, 1922, pp. 14–20 & 49–56.

The nature, aetiology and transmission of bovine piroplasmosis are described. The treatment suggested includes immunisation, for which the various methods are quoted, the destruction of ticks by means of dips and ointment, and the cleaning of the pasture by burning.

Sergent (Ed.) & Foley (H.). **L'Epidémiologie de la Fièvre récurrente dans l'Afrique du Nord.**—*Trans. R. Soc. Trop. Med. & Hyg., London*, xvi, no. 3, 22nd June 1922, pp. 170–187, 5 figs., 1 chart.

For the purpose of comparison with Cragg's paper [*R.A.E.*, B, x, 142] the authors review their observations made in North Africa during 1907–14; from these it was found that recurrent fever and typhus had the same seasonal distribution, followed the same course, and might either succeed each other or occur simultaneously.

The louse, *Pediculus humanus* (*vestimenti*), is accepted as the vector of recurrent fever [*R.A.E.*, B, iv, 134], but the disease is apparently not transmitted by biting. Infection has been produced by inoculation and by placing crushed infected lice on abrasions on the skin.

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CABALLERO (A.). **Las Especies del Género *Chara* y las Larvas de los Mosquitos.**—*Anales Inst. Gen. y Tec. de Valencia,* Trab. Lab. Hidrobiol. Esp., no. 10, 1920, 17 pp.

An abstract of this paper on the noxious effects of *Chara* spp. on mosquito larvae has already been briefly noticed [*R.A.E.*, B, x, 108].

As it was thought that a film that was present on the surface of the water might be due to some exudation from the *Chara* that caused the death of the larvae by asphyxiation, care was taken that such a film should not be allowed to form on the water. The result, however, was the same, and the larvae of *Stegomyia* died almost immediately upon hatching from the egg, while those kept in a neighbouring tank free from the alga developed in the normal way.

The question of the quantity of the alga necessary to produce fatal results can best be determined for the various species of *Chara* by detailed observation in the field. It is thought that the alga could easily and quickly be disseminated among all standing or slowly-moving water (except temporary rain-pools) that forms suitable breeding-places for mosquitos. The method suggested is to throw a few cuttings into the pools, with something to weight them so that they will sink and can become attached to the bottom of the pool.

Apart from the question of public health, that of the rice industry has been considered, and it has been found that *Chara* and rice can be grown together without any detriment to the rice crop.

ZETEK (J.). **La Fiebre Malaria en Panama.**—*Rev. La Salle, Panama,* October 1921–February 1922, nos. 61–65, pp. 292–296, 373–377, 391–399, 436–439, 5 figs. [Received 25th September 1922.]

This is a general review of malaria as occurring in the Panama Canal Zone, with an account of the parasites causing it and its transmission by Anophelines, much of the information being taken from other sources [*R.A.E.*, B, x, 11, etc.].

DE VERTEUIL (E.). ***Anopheles* and Malaria Control in the Brighton-La Brea Rural Sanitary District, Trinidad, B.W.I.**—*Trans. R. Soc. Trop. Med. & Hyg., London,* xvi, no. 3, 22nd June 1922, pp. 99–118, 4 charts, 9 figs.

In spite of efficient screening of houses, proper attention to the drains and constant removal of grass, the rainy season in the south-west of Trinidad has always been followed by a large increase in the number of malaria cases. The locality in question is described. Further measures recently instituted include the immediate and constant cutting of grass within 200 yards of buildings. All drains within the same range were brushed, cleaned and graded, and any other breeding-places were filled in or drained. The sides of all these drains were burned with a mixture of crude oil and distillate by means of an ordinary hand-pump spray such as was used extensively in Panama. The grass was thus checked for a period of about three months. All pools and collections of stagnant water were sprayed with crude oil. Within five or six weeks the satisfactory results of these measures were evident, as very few Anophelines were to be found. Their effect could, however, only be temporary and they required a large and recurrent expenditure. In 1921 the drains were lined with a hard waterproof lining of asphalt and sand ; this prevents the growth of

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grass and other vegetation in the drains, and resists the scouring action of heavy rains. Sanitary oil was found to be suitable for spraying pools and cesspits, and retains its efficacy for some time. Pools that could not be drained have been lined in the same way and sprayed at intervals with sanitary oil. By this method the mosquitos have been exterminated and the cost of the upkeep of drains greatly reduced. Drains in which there is a continuous flow of water throughout the year cannot be lined in this way unless the water can be temporarily diverted. This method is also not applicable to drains in towns and village streets owing to the danger of fire.

The commonest Anopheline in the district is *Anopheles tarsimaculatus*, Dyar, the only other species being *A. argyritarsis*, R.D., and *A. apicimacula*, D. & K. The breeding-places of *A. tarsimaculatus* are peculiar to the district, and owe their existence to an asphalt lake and to numerous outcrops of asphalt for a distance of half to one mile or more from it. These pitch holes are of two varieties and are very numerous, forming permanent Anopheline breeding pools. Attempts to fill them in have failed, and their drainage also offers great difficulties, in view of which the only alternative method is to clear the holes of all grass and to rely on the fish they contain to destroy the larvae. The fish occurring in the lake are *Rivulus harti*, which is a voracious feeder on the larvae, millions (*Lebistes reticulatus*) and *Polycentrus schomburghi*.

Seepages were dealt with by the usual method of intercepting drains, and in some cases by the free application of sea sand, which, besides being economical, acts by destroying the algae and other vegetation and by absorbing the water.

During 1920 adult Anophelines were found almost everywhere, but now they are very seldom seen in the treated area in spite of a most favourable rainy season.

By the application of the methods described it is thought that malaria control in Trinidad is quite possible, and there is no reason why individual efforts, apart from Government measures, carried along the same lines should not be successful at comparatively small expense.

HOARE (C. A.). **Trypanosomiasis in British Sheep. (Preliminary Communication.)**—*Trans. R. Soc. Trop. Med. & Hyg., London*, xvi, no. 3, 22nd June 1922, pp. 188–194, 11 figs.

Previous work on trypanosomes of sheep and their probable transmission by the Hippoboscid, *Melophagus ovinus*, is reviewed. The present observations prove definitely that the sheep trypanosome is transmitted by *M. ovinus*, though not by biting ; this is contrary to Kleine's statement (*Deutsch. Tierärztl. Wochenschr.*, xxvii, no. 38, 1919, p. 408) that the flagellates found in the proboscis are the important factors in transmission, and that the gut forms are of no importance. Sheep may be bitten by infected flies without acquiring infection, but as a result of the sheep nibbling the flies off their bodies, the flagellates are released and penetrate through the mucous membrane into the blood. In the absence of the fly, sheep remain free from trypanosomes.

There is no doubt that the flagellate, *Crithidia melophagi*, is the invertebrate stage of the sheep trypanosome. It occurs in the mid-gut of the fly, but in the hind-gut it is transformed into a small trypanosome, a fact that appears to have been overlooked and even denied by some

observers. The identity of *C. melophagi* with *Trypanosoma melophagi* is confirmed by a comparison of cultures [*cf. R.A.E.*, B, viii, 45, etc.]. Details of these experiments and the complete life-history of the trypanosome are to be published later.

HAWORTH (W. E.). **[A new Breeding Place for Mosquitos.]**—*Trans. R. Soc. Trop. Med. & Hyg., London*, xvi, no. 3, 22nd June 1922, p. 201.

In Tanganyika Territory mosquitos have been found breeding in the tops of coconut palms. The species concerned are *Anopheles costalis, Culex tigripes, C. fatigans, Aëdes* (*Stegomyia*) *metallicus*, and *A.* (*S.*) *argenteus* (*fasciata*), the last-named being prevalent at Dar-es-Salaam, whereas at Tanga *C. fatigans* is the commonest species. Breeding continues throughout the year.

BENTLEY (C. A.). **Some Economic Aspects of Bengal Malaria.**—*Ind. Med. Gaz., Calcutta*, lvii, no. 9, September 1922, pp. 321–326, 3 plates.

The admitted increase of malaria in Bengal can only be explained on the assumption that there has been a corresponding increase in the number and distribution of Anophelines and malarial parasites in the areas affected. Unfortunately there are no actual observations on this point, but there are grounds for believing that these mosquitos are far more prevalent during July and October than they used to be, the change being associated with a greatly lessened supply of water. The other important variations responsible for the depopulation of this area are also discussed. The reversion of cultivated or inhabited areas into jungle has become very apparent, and is frequently considered to be a primary cause of the general increase of malaria and depopulation. All the important changes associated with the loss of population occurring in so many areas in Bengal are consistent with a reduction in the water supply of the affected localities. One of the chief causes of this appears to be the construction of embankments. Although it has been repeatedly said that these embankments have impeded drainage and led to water-logging, resulting in an increase of malaria, various investigations show that, with very few exceptions, the country under the influence of the embankments is much drier than it used to be. The most malarious districts are those where water is scarce.

MACKIE (F. P.). **The Problem of Kala-azar.**—*Ind. Med. Gaz., Calcutta*, lvii, no. 9, September 1922, pp. 326–331, 1 plate.

This paper deals with various aspects of kala-azar, such as the different forms of diagnosis, the method of infection of the human host, and the means by which the parasite, *Leishmania donovani*, is transmitted to, and escapes from that host.

CROSS (H. E.) & PATEL (P. G.). *Hypoderma* **Larvae in Goats.**—*Punjab Dept. Agric., Lahore*, Vet. Bull. no. 3, 1921, 3 pp., 1 plate. [Received 9th October 1922.]

Much damage is caused to the skins of goats in India by the larvae of *Hypoderma* sp. It has been estimated that one-quarter of the hides exported are depreciated in value from 50 to 70 per cent. as a result. The life-history and appearance of the maggots are described. They are found in October and November under the skin along the back of

the goat, and at the end of December and early January fall to the ground and pupate. Adult flies emerged from pupae kept in the laboratory between 19th February and 1st March in 1921. In India, where there is always a goatherd in charge of the animals, it would be an easy matter to examine the goats daily and to squeeze out and destroy the larvae. The quarters where they are kept at night should also be examined each morning, and any larvae that have fallen to the ground should be destroyed.

Strauss (P.). **Sur la Destruction des Mouches domestiques. Circulaire du Ministre de l'Hygiène, de l'Assistance et de la Prévoyance sociales.**—*Jl. d'Agric. Prat., Paris*, xxxvii, no. 18, 6th May 1922, pp. 361–362. [Received 29th September 1922.]

The object of this circular, dated 15th April 1922, is to emphasise the importance of destroying house-flies [*Musca domestica*, L.], the measures to be adopted being based largely on the work of Vaillard [*R.A.E.*, B, i, 191].

Ferguson (E. W.) & Hill (G. F.). **Notes on Australian Tabanidae. Part ii.**—*Proc. Linn. Soc. N.S.W., Sydney*, xlvii, pt. 3, 15th September 1922, pp. 245–265, 10 figs.

In this continuation of a paper already noticed [*R.A.E.*, B, ix, 62], the new species recorded are *Silvius equinus*, *Tabanus pseudopalpalis* (previously recorded by Taylor as *T. nemopunctatus*, Ric. [*R.A.E.*, B, vi, 74]), *T. pseudocallosus*, *T. breinli*, *T. palmensis*, *T. torresi*, *T. wentworthi*, and *T. griseicolor*.

The following new names are suggested: *T. alternatus* for *T. limbatinervis*, Macq. (nom. praeocc.), *T. alternatus* var. *magneticus*, n.; *T. palmerstoni* for *T. minusculus*, Ferg. & Hill (nec Hine) which was itself originally proposed for *T. minor*, Tayl. (nec Macq.) [*R.A.E.*, B, ix, 62]; *T. rivularis* for *T. pygmaeus*, Ferg. & Henry (nec Will.); *T. moretonensis* for *T. confusus*, Tayl. (nec Walk.); *T. neolatifrons* for *T. latifrons*, Ferg. (nec *latifrons*, Zetterstedt, which is itself a synonym of *cordiger*, Meigen); *T. adelaidae* for *T. meridionalis*, Ferg (nec Thunb.); and *T. milsoniensis* for *T. milsoni*, Tayl. (nec *milsonis*, Ric.).

Reichenow (E.). **Die Hämococcidien der Eidechsen.** [The Haemococcidia of Lizards.]—*Arch. f. Protistenk., Jena*, xlii, pt. 2, 1921, pp. 179–292, 8 plates, 17 figs.

This paper on the transmission of blood parasites of lizards by mites has already been noticed from another source [*R.A.E.*, B, viii, 208].

Buchner (P.). **Über ein neues symbiontisches Organ der Bettwanze.** [A new Symbiotic Organ of the Bed-bug.]—*Biol. Zentralblatt, Leipsic*, xli, no. 12, 1st December 1921, pp. 570–574.

The organ here described is found in *Cimex* (*Acanthia*) *lectularius* in the third abdominal segment beside the intestine and in the neighbourhood of the sexual organs. It occurs in both sexes, its sole function being apparently to harbour symbiotic bacteria.

Dubois (R.). **Sur la destruction des Moustiques par les Anguilles.**—*Bull. Agric. Algérie–Tunisie–Maroc, Algiers*, xxviii, no. 7, July 1922, pp. 197–198; also in *C. R. hebdom. Acad. Sci., Paris*, clxxv, no. 10, 4th September 1922, pp. 431–432.

Eels have been proved to be of great value in destroying numerous aquatic insects in France, and they also feed on the young stages of mosquitos. One tank heavily infested with mosquito larvae was found to be free from them after the introduction of eels. Even the adult mosquitos are snapped at when the eels come to the surface to breathe, as they do in polluted water. Experimentally these fish have been transferred from salt to fresh water and also kept in waters of various degrees of pollution without any apparent detrimental effect on them. This capacity for resistance to varying conditions and the facility with which they can be obtained and transported in large numbers are factors in favour of utilising them against mosquitos.

Balfour (A.). **Report on Medical and Sanitary Matters in Mauritius, 1921.**—*London*, 1922, f'scap. fol., vii + 168 pp., 3 maps, 5 plans, 1 chart, 2 graphs, 130 plates.

In this report of the investigations undertaken in 1921 into the sanitary conditions of Mauritius and the measures needed to improve the health of the population, the general features of the Colony are outlined.

As regards insect-borne diseases, little is known about the incidence and distribution of filariasis, but *Culex fatigans* is a vector of *Filaria* (*Microfilaria*) *bancrofti*. Possibly other species are concerned, as *Aëdes* (*Stegomyia*) *albopictus* (*scutellaris*) and *Anopheles costalis* are widespread, the former being a known vector in Malaya, and the latter on the west coast of Africa. Plague had been absent since 1915, but in 1921 one rat was found infected with *Bacillus pestis*, and during the author's visit there was a recrudescence of the disease. Although lice are prevalent, there is no definite evidence to show that typhus exists or has existed in Mauritius.

Anopheles costalis is the principal and probably the only vector of malaria. *A. maculipalpis* is rare, and *A. mauritianus* is still regarded as not transmitting the disease. *A. costalis* does not breed in shady places, partly owing to the absence of algae, and does not seek the shelter of stables and cowsheds. Observations on the breeding-places and hibernation of this species, and the possible value of *Culex tigripes* in destroying its broods have already been noticed [*R.A.E.*, B, x, 106]. A brief summary is given of anti-mosquito measures.

The author urges the importance of extending invitations to research workers to visit Mauritius and endeavour to solve several of the more pressing problems there. The difficulties of rendering the island healthy in a short space of time are many, but if this can be done, its future might be assured [*cf. R.A.E.*, B, x, 94].

Macfie (J. W. S.) & Ingram (A.). **Accra Laboratory Report for the Year 1921.**—*Med. Res. Inst., Accra*, 1922, pp. 41–51.

During 1921 two mosquitos new to Accra, *Eretmopodites quinquevittatus*, Theo., and *Culex annulioris*, Theo., were reared from larvae, bringing the total number of species recorded from this district up to 64. Of 532 larvae taken in samples, 71·6 per cent. were *Aëdes argenteus*, Poir. (*Stegomyia fasciata*, F.), and 22·9 per cent. *Culex*

fatigans, Wied. Others were *C. thalassius*, Theo., *Anopheles costalis*, Lw., *A. funestus*, Giles, *A. mauritianus*, Grp., *Lutzia* (*Culex*) *tigripes* var. *fuscus*, Theo., *Culex decens*, Theo., *C. tritaeniorhynchus*, Giles, *Culiciomyia nebulosa*, Theo., *Cyathomyia fusca*, Theo., *Mimomyia hispida*, Theo., *M. mimomyiaformis*, Newst., *Aëdes* (*Ochlerotatus*) *apicoannulatus*, Edw., *A.* (*O.*) *irritans*, Theo., *A.* (*Stegomyia*) *luteocephalus*, Newst., *A.* (*S.*) *metallicus*, Edw., and *A.* (*S.*) *simpsoni*, Theo. Of the adult mosquitos taken in houses 80 per cent. were collected in August, and 84·5 per cent. of the total number were *C. fatigans*, which proves that very few individuals of *A. argenteus* appear indoors during the bright hours of the day. When the rainfall is low the number of *A. argenteus* increases in the samples of larvae, while *C. fatigans* decreases. Other species collected in houses were *A.* (*O.*) *irritans*, *C. thalassius*, *Anopheles costalis*, *A. funestus*, *Banksinella lineatopennis*, Ludl., and *C. quasigelidus*, Theo.

The pouched rat, *Cricetomys gambianus*, almost equals *Mus rattus* in numbers and is heavily parasitised by *Xenopsylla aequisetosus*, End. It is possible that like *X. astia* in India [*R.A.E.*, B, ix, 125], this flea may be a less efficient carrier of plague than *X. cheopis*, which might account for the localisation of the disease so far noticed at Accra.

Cimex (*Clinocoris*) *hemiptera*, F., was also found on *C. gambianus*, and the Gamasid mite, *Laelaps echidninus*, Berl., was taken on *Mus decumanus*.

An Anthomyiid fly, *Lispa armipes*, Beck., was taken in two collections of insects. It is an abundant fly in West Africa where its habits of preying on mosquitos are similar to those of the Chinese species, *Lispa sinensis*, Schiner [*cf.* also *R.A.E.*, B, ix, 42.]

BAU (A.). *Ornithoctona albiventris* **nov. spec. und** *Ornithoica melaleuca* **nov. spec. (Diptera pupipara: Hippoboscidae).**—*Centralbl. Bakt. Paras. Infekt., Jena*, IIte. Abt., lvii, no. 11–13, 2nd October 1922, pp. 274–279.

Hippoboscid flies recorded from Cuba are *Ornithoctona haïtiensis*, Bigot; and *Ornithoctona albiventris*, sp. n., and *Ornithoica melaleuca*, sp. n., from owls. Keys to the genera *Ornithoctona* and *Ornithoica* are given.

ENDERLEIN (G.). **Ein neues Tabanidensystem.** [A new Classification of Tabanidae.]—*Mitt. Zool. Mus., Berlin*, x, no. 2, August 1922, pp. 333–351.

These keys to the subfamilies and genera of TABANIDAE according to the author's classification are reproduced without notes as an excerpt from a more extensive work on the subject. Many new genera are proposed.

SIMMONDS (H. W.). **Entomological Notes.**—*Agric. Circ. Fiji Dept. Agric., Suva*, iii, no. 2, April–June 1922, p. 24.

The Hymenopterous parasite of *Musca domestica* (house-fly) found in stable manure in Fiji [*R.A.E.*, B, x, 169] has now been identified as a species of *Spalangia*. Two or three species of this genus are known as parasites of Diptera in Queensland and Hawaii, and the one in question has probably been introduced from one of these sources.

Wood (H. P.). **Eradication of Lice on Pigeons.**—*U.S. Dept. Agric., Washington, D.C.,* Circ. 213, April 1922, 4 pp. [Received 5th October 1922.]

Since the publication of a bulletin recommending sodium fluoride for pigeon lice [*R.A.E.*, B, vi, 14], a method has been perfected by which the lice on a flock of pigeons can be eradicated by one treatment. Choosing a warm summer day, each bird should be dipped in a solution of 1 oz. commercial sodium fluoride, with ¾ oz. hard laundry soap in one U.S. gal. water, until it is soaked to the skin. The head should be ducked for a moment before the bird is freed. Dusting with sodium fluoride gives a high degree of control though not complete eradication; one advantage of this method is that it can be used at any season. Insecticides in the birds' bath water have been found quite ineffective.

The above treatment was effectual against *Lipeurus baculus*, N., and *Goniocotes compar*, N., the two most abundant species; no doubt it would prove equally successful against the other lice that are commonly recorded in the United States, namely, *Colpocephalum latum*, N., *Menopon longicephalum*, Kell., and *Goniodes damicornis*, N.

Walker (E. M.). **Some Cases of Cutaneous Myiasis, with Notes on the Larvae of *Wohlfahrtia vigil* (Walker).**—*Jl. Parasitology, Urbana,* ix, no 1, September 1922, pp. 1–5, 3 plates.

Two further cases of cutaneous myiasis in young infants, caused by the Sarcophagid, *Wohlfahrtia vigil*, Wlk., are recorded from Ontario [*R.A.E.*, B, ix, 1]. These larvae, instead of entering through one of the natural orifices, as in the case of *W. magnifica*, cause lesions scattered over an otherwise healthy and uninjured skin. The bucco-pharyngeal sclerites of the first and second instars are described, in order to facilitate recognition of any stage of the parasite.

A further case is recorded from Philadelphia of an infant that was severely infested with fly larvae, but of a different species, closely resembling the first instar of *Musca domestica*. Descriptive notes and figures of these larvae are given in the hope that their determination may be possible at some time when the earliest stages of the Muscid larvae are better known.

McDaniel (E.). **Cockroaches: Methods of eradicating this troublesome Pest.**—*Michigan Agric. Expt. Sta. Qtrly. Bull., East Lansing,* v, no. 1, August 1922, pp. 38–39.

The cockroaches that are domestic pests in the north-eastern United States are *Blatella germanica*, *Blatta orientalis*, *Periplaneta americana* and *P. australasiae*. The first is the most widely distributed. A successful poison bait consists of three cups of linseed meal, mixed with water into a thin mash, one cup of molasses (not corn syrup), and one yeast cake softened in a cup of water and allowed to stand until it ferments; to this 2 tablespoonfuls of lead arsenate should be added when mixed. This bait is most effective where the cockroaches have little or no water. As the period of fermentation is short the bait should be renewed every few days. Powdered borax may be substituted for sodium fluoride (which, though the best method of destroying this pest, is poisonous to man) and can be mixed with one-fourth as much fresh pyrethrum.

A Mosquito Manual for Use in New Jersey Schools.—*New Jersey Agric. Expt. Sta., New Brunswick, N.J.*, Circ. 130 [n.d.], 16 pp., 23 figs. [Received 10th October 1922.]

This general account of mosquitos, their life-history, their connection with human disease, and practical methods for their extermination has been compiled by the associated executive of mosquito control in the State of New Jersey for use in schools.

HEADLEE (T. J.) & WALDEN (W. M.). **Report of Mosquito Work.**—*Rept. New Jersey Agric. Expt. Sta., 1920–21, New Brunswick, N.J.*, 1922, pp. 409–419, 1 table, 2 figs.

Particulars of the mosquito control work carried out during the year are given, including various drainage and outlet operations. Experiments were made with two larvicides, but they proved useless. The mosquitos observed were *Aëdes cantator, A. sollicitans, A. taeniorhynchus, A. sylvestris, Culex pipiens* and *Anopheles quadrimaculatus*. Malaria was more widespread than for many previous years, owing to the more extended distribution of the last-named species.

BRIMLEY (C. S.). **Additional Data on North Carolina Tabanidae, Bombyliidae and Tachinidae (Diptera).**—*Ent. News, Philadelphia, Pa.*, xxxiii, no. 8, October 1922, pp. 230–232.

The species recorded include eleven Tabanids, of which all except one are new to North Carolina.

METALNIKOV (S.). **L'Anaphylaxie et l'Immunité.**—*Ann. Inst. Pasteur, Paris*, xxxvi, no. 9, September 1922, pp. 632–645.

Experiments with the larvae of *Cnethocampa pityocampa* confirm the observations with regard to *Galleria mellonella* described in a previous paper [*R.A.E.*, B, ix, 177].

MARTINI (E.). **Kritische Bemerkungen zur Theorie der „misanthropen" oder „zoophilen" Anophelen.** [A Criticism of the Theory of "misanthropic" or "zoophilous" Anophelines.]—*Arch. Schiffs.- u. Trop.-Hyg., Leipsic*, xxvi, no. 9, October 1922, pp. 257–265.

It has been stated that in northern Europe there exists a race of *Anopheles maculipennis* that does not readily bite man, and that malaria has decreased in consequence [*R.A.E.*, B, viii, 141, etc.].

The fact that it is unusual for *A. maculipennis* to attack man has been taken to imply a change in its habits, but this presupposes that it was in the habit of biting more frequently in former times. Such a supposition is based on the former prevalence of malaria. As, however, Meigen, Macquart and Schiner doubted whether *A. maculipennis* bites, this mosquito seems to have behaved formerly just as it does now. Furthermore, the fact that biting is not observed proves nothing, as the attack occurs at night and is painless. One of the chief difficulties of those engaged in combating malaria in the Balkans was that the troops were not inconvenienced by the mosquitos. The sucking of blood on cattle is quite as rarely observed as on man. In experiments under a mosquito net the author found that *A. maculipennis* bites quite as readily as *A. bifurcatus* (which is not considered to be a species that avoids man) and more so than *Theobaldia annulata*

and *Culex pipiens*. There is no reason for thinking it behaves differently in the open field. While therefore it is quite possible for a change of instinct and the development of a new race to occur, there is no basis for this hypothesis at present.

With regard to the points raised by Roubaud as to variations in size and in the number of maxillary teeth [*R.A.E.*, B, x, 53], it is pointed out that in many cases individuals developed at low temperatures are larger than those developed at a high temperature, and that, probably, the larger individuals will have on the average a larger number of teeth. There is, at present, no justification for ascribing such variations to racial differences.

The value of cattle in protecting man from this mosquito remains an established fact. The author recorded in 1916 that in one case malarial and other patients remained in the same barracks without the occurrence of indoor infection, because the mosquitos assembled in the military stables across the road.

The increase, and more so the decrease, of cattle may have considerable effect on the occurrence of malaria, and this may be one factor in the occasional appearance of the disease under the conditions that war and poverty give rise to. As regards the occurrence in an unusual situation of Anophelines in numbers disproportionately large as compared with surrounding infestations, it must be remembered that this peculiarity is common to all mass occurrences of insects.

An increase of cattle is not likely to lead to an increase of Anophelines under ordinary rural conditions, so that it can only be beneficial.

SIKORA (H.). **Neue Rickettsien bei Vogelläusen.** [New Rickettsia in Bird Lice.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic*, xxvi, no. 9, October 1922, pp. 271–272.

Rickettsia have been obtained from *Lipeurus baculus* on pigeons, and similar organisms in Mallophaga on the swift. *Rickettsia* are also recorded in *Menopon* from the domestic fowl.

EDWARDS (F. W.). **A Synopsis of Adult Oriental Culicine (including Megarhinine and Sabethine) Mosquitos. Part II.**—*Ind. Jl. Med. Res., Calcutta*, x, no. 2, October 1922, pp. 430–475, 3 plates.

In the second part of this synopsis [*R.A.E.*, B, x, 197] keys are given to, or descriptive remarks made on, the following genera: *Megarhinus, Uranotaenia, Hodgesia, Harpagomyia, Zeugnomyia, Topomyia, Rachionotomyia, Wyeomyia, Heizmannia, Haemagogus, Mucidus, Pardomyia, Armigeres, Mimomyia, Ficalbia, Taeniorhynchus, Theobaldia, Aëdomyia*, and *Orthopodomyia*.

Uranotaenia roperi, recently described [*loc. cit.*] may prove to be the same species as *U. subnormalis*, Mart. It had previously been suggested that *U. bimaculata*, Leic., might be conspecific with *U. mashonaensis*, Theo., from Africa, but it is now shown to be quite distinct. Leicester's descriptions of the thorax of *U. bicolor* and *U. fusca* do not agree very closely, but the latter is undoubtedly a synonym of the former. *Topomyia decorabilis*, Leic., is so distinct from other species that it might almost be placed in a separate genus. *T. argyropalpis*, Leic., may be the same as *Kingia gregoryi*, Ludl., from the Philippines, but examination of the males will be necessary to prove this. The species described as *Scutomyia treubi*, Meij., requires further study; it is probably an *Armigeres*. *Taeniorhynchus nigrosignatus*, a name proposed by the author for the mosquito wrongly determined

by Theobald as *T.* (*Culex*) *conopas*, Frauenfeld, proves to be a synonym of *T. giblini*, Tayl. The only oriental species of *Aëdomyia*, Theo., is *A. catasticta*, Knab.

A synonymic list of Oriental Culicines is given.

Row (R.). **On " Reversion of the Flagellate Form of *Leishmania donovani* and *Leishmania tropica* to the resistant non-flagellate Torpedo and *O* Body, in Culture Tubes and its Bearing on the Attempts at the Search for the Transmitter."**—*Ind. Jl. Med. Res., Calcutta*, x, no. 2, October 1922, pp. 476–481, 1 plate.

An experimental infection of the vertebrate host with *Leishmania donovani* or *L. tropica* can only be successful if the resistant forms of the parasite, that is, the *O*, torpedo or oat-shaped bodies, are present. The flagellates are very delicate, plasmolysing in contact with human serum, and being readily phagocytised by leucocytes. When, therefore, search is being made for a transmitter, especially among blood-sucking insects, it is not the presence of flagellates in the intestines that is important, but the abundance of resistant forms, even to the exclusion of flagellates. Flagellates alone may be found in certain parts of the intestinal tract of the bed-bug (*Cimex*) even 31 days after a clean feed; but they may also be found in equal or greater numbers in a test-tube containing the nutrient favourable to their growth, namely haemoglobin.

In view of the importance of the *O* body, experiments were undertaken to ascertain the factors that influenced its production. Desiccation or concentration of the culture medium seems to be an important factor, and the time taken by the parasites to pass through the various phases between the first very motile flagellates and the final *O* bodies appears to be at least 13 weeks.

In bed-bugs, on the other hand, previous observations have tended to show that the flagellates once present in the intestine after a single feed will probably die out ultimately, unless the insects have a subsequent feed of healthy blood (when they reappear even in situations where they were apparently absent).

In view of the factors of time and desiccation in the formation of resistant bodies from the flagellates, their production in an insect host would involve the assumption that such an insect should dry up, and at the same time should live long enough on one feed alone.

These considerations, coupled with the work of other investigators [*cf. R.A.E.*, B, x, 73], go far to exculpate the bug from the charge of being the transmitter of kala-azar and Oriental sore—especially as no positive transmission experiment has ever been effected.

The possibility is suggested that there may perhaps be a third agency necessary, in the form of a second set of insectivorous or insectiferous agencies that might take up the already multiplied flagellates and complete their developmental cycle, or take up the first host in its drying-up condition and thus act as intermediate transmitters.

Iyengar (M. O. T.). **The Larva of *Anopheles annandalei*, Prashad.**—*Ind. Jl. Med. Res., Calcutta*, x, no. 2, October 1922, pp. 526–529, 1 plate.

The original description of the larva of this mosquito [*R.A.E.*, B, viii, 31] is amplified, particularly with reference to the characters differentiating it from those of other species. Three individuals collected recently from tree-holes in Assam are thought to be this species.

CHRISTOPHERS (S. R.). **The Development and Structure of the terminal Abdominal Segments and Hypopygium of the Mosquito, with Observations on the Homologies of the terminal Segments of the Larva.**—*Ind. Jl. Med. Res., Calcutta,* x, no. 2, October 1922, pp. 530–572, 4 plates, 7 figs.

A recent study has been made of the development of the terminal abdominal segments and hypopygium in *Cimex* [*R.A.E.*, B, x, 72]. The present paper is a similar study of the same parts in the male mosquito. A description of the female parts and their development is reserved for a further communication. The species in which the development has been followed are *Anopheles gigas*, Giles, *Theobaldia niveitaeniata*, Theo., *Aëdes* (*Stegomyia*) *argenteus*, Poir. (*fasciata*, F.), *Aëdes* (*Finlaya*) *pulchriventer*, Giles, and *Culex concolor*, R.-D.

PATTON (W. S.). *Hypoderma crossii*, **sp. n., parasitic in its Larval Stages in Cattle and Goats in the Punjab.**—*Ind. Jl. Med. Res., Calcutta,* x, no. 2, October 1922, pp. 573–578, 2 plates, 4 figs.

Larvae removed from the skins of goats in the Punjab [*cf. R.A.E.*, B, x, 223] prove to belong to a new species of *Hypoderma*, which is here described as *H. crossi*, sp. n. The number of larval stages has not yet been determined. It is possible that the female oviposits directly on the long hairs on the sides of the goat, and that the larvae enter the skin below and remain there, without migration as in the case of *H. bovis* and *H. lineata*. No eggs have been found on the legs of goats examined. About 90 per cent. of goats in the Jhelum district are infested, but in the Gurdaspur district only a small percentage is attacked; the natives believe that infestation is confined to the hilly districts of the Punjab. Further records of the distribution are desirable.

AWATI (P. R.). **Survey of Biting Insects of Assam with Reference to Kala-azar for the whole Year from November 1921 to October 1922. Biting Insects found in Dwelling-houses.**—*Ind. Jl. Med. Res., Calcutta,* x, no. 2, October 1922, pp. 579–591, 4 figs.

A survey has been made of the Polasbari and Jorhat districts lying between the Brahmaputra and the Assam Range, large areas of which are infected with kala-azar; and as many as possible of the insects associated either directly or indirectly with human beings in these districts have been collected. The meteorological and physiographical conditions of the areas are discussed. The numbers of *Cimex hemiptera* (*rotundatus*) found were more or less equal in the infected and the uninfected areas, but in both areas the collections during the wet weather resulted in less than half the numbers taken in the dry weather. This difference may be due to the continuous high temperature accompanied by high humidity in the wet season, or to artificial factors (such as habits of the population), which may cause destruction or disappearance of the bugs. *Pediculus humanus* was less prevalent in the uninfected area than in the infected; its distribution was unaffected by the season. The proportion of the sexes of *Cimex* was nearly equal in both areas, while in *P. humanus* it varied a good deal. Other biting insects collected included *Triatoma* (*Conorhinus*) *rubrofasciata*, which is found in the infected area throughout the year,

but has not yet been found in the uninfected area, *Phlebotomus perturbans*, ticks, *Trombidium* spp. (mites), Muscid larvae (? Calliphorines) in pigeons nests, fleas in houses, *Penicillidium* spp. on bats, and *Lynchia* spp. on pigeons.

Parker (G. H.). **Possible Pedogenesis in the Blow-fly,** *Calliphora erythrocephala,* **Meigen.**—*Psyche, Boston,* xxix, no. 4, August 1922, pp. 127–131.

In breeding experiments with *Calliphora erythrocephala,* Meig., during the autumn of 1918 the number of larvae often exceeded the number of eggs. Consequently tests were made, which are here described. As a result of these it is considered that in October and November or even later this fly may increase by paedogenesis but not by polyembryony.

Smit (H. J.). **Parasitologische Studien in Niederländisch-Indien. 11. Gastrophiluslarven in Niederländisch-Indien.** [Parasitological Studies in the Dutch East Indies. 11. The Larvae of *Gastrophilus.*] —*Deutsche Tierärztl. Wochenschr., Hanover,* xxx, no. 41, 14th October 1922, pp. 546–547.

This is one of a series of studies and deals with larvae of *Gastrophilus* from the stomach and pharynx of a horse imported from China. Flies of this genus are practically unknown in the Dutch East Indies, and though natural conditions do not seem to be unfavourable, there appears to be little danger of a serious increase as a result of importation. Some years ago goats infested with *Oestrus* were imported from Bengal, but no reports have been received of any infestation in native goats. Similarly *Hypoderma bovis* has occurred in cattle imported from Holland but there is apparently no record of its occurrence in native cattle.

Hill (G. F.). **Notes on the Habits and Distribution of some North Australian Culicidae.**—*Australia Dept. Health, Melbourne,* Serv. Pubn. 21, 1922, 40 pp., 11 plates.

Notes are given on 34 species of mosquitos occurring in North Australia. The most widely distributed is undoubtedly *Anopheles annulipes,* Wlk. One of its favourite breeding-places is a series of small puddles and hoof-holes in the vicinity of large fresh-water swamps. The large swamps are frequently inhabited by numbers of Notonectid bugs, which are never found in the small puddles, and it is probably their presence that accounts for the absence of *A. annulipes.* Small stagnant pools or collections of brackish water almost invariably harbour this species. The adults are present throughout the year and are often found in houses, the males generally predominating, especially in the cool season (June and July). Both sexes are usually prevalent during this season, when the swamps are drying off and the more permanent waters are at their lowest level ; but an interval of drought between the summer rains will result in an unusually heavy midsummer abundance. The comparative scarcity during normal wet seasons is probably due to the larvae being unable to survive in rapid streams or in the pools flooded by the rising of the swamp waters. Apparently a period of desiccation is fatal to the developing embryo in the eggs, and the reappearance of the mosquitos in a locality where there is no surface water for many months at a time remains unexplained. Much variation exists in the colour and the characters

of the scales in the adult of this mosquito. One form, *A. amictus*, Edw., has recently been given specific rank.

A. barbirostris, Wulp, var. *bancrofti*, Giles, is apparently confined to the coastal districts of Queensland and of the Northern Territory. The larvae are found practically wherever there are fresh-water swamps or sluggish streams with more or less luxuriant vegetation, and they are frequently associated with *A. annulipes*. It is rare in houses, except in the vicinity of jungle or swamp. Horses, cattle, buffalos, kangaroos and birds are probably the normal hosts.

Aëdes (*Stegomyia*) *albopictus*, Skuse, has not been recorded in Australia since its discovery in 1913, though individuals have been received from Moa Island (Torres Straits). *A. argenteus*, Poir. (*Stegomyia fasciata*, F.) is the most abundant and troublesome species in Townsville. It is found throughout the year and is often present in dwellings, biting generally by day. *Culex fatigans*, Wied., is also abundant and annoying in houses, feeding always by night. Larvae are numerous in fresh-water tanks, yard drains and any collections of water in domestic receptacles about houses. *Aëdes* (*Ochlerotatus*) *vigilax*, Skuse, is widely distributed along the coastal districts and probably to a large extent inland. It is most abundant in mangrove swamps, tidal creeks and the neighbouring scrub. It is believed that the adults fly as far as four miles or more from their breeding-places to the towns. *A.* (*O.*) *notoscriptus*, Skuse, is widely-distributed and is found in numbers locally, breeding in rot-holes, pools in fallen tree-trunks, etc. It is abundant through the greater part of the year. *Aëdes* (*Skusea*) *funereus*, Theo., is often found in habitats similar to those of *A. notoscriptus*, and is frequently in association with it and also with *A.* (*O.*) *quasirubrithorax*, Theo.

Gordon (R. M.). **The Susceptibility of the Individual to the Bites of** *Stegomyia calopus*.—*Ann. Trop. Med. & Parasit., Liverpool*, xvi, no. 3, 18th October 1922, pp. 229–234, 1 fig.

In order to determine the importance of certain variable factors in individuals, regarded as hosts of the mosquito, *Aëdes* (*Stegomyia*) *argenteus* (*calopus*), feeding experiments were undertaken and records made of the results under the headings of length of residence in Brazil, sweating and hairiness of skin surface, coloration, age and nationality. The number of individuals tested (88) and the number of bites (619) were too small to admit of definite conclusions, but the figures suggest that none of these factors has any marked influence on the number of bites received. There is probably, however, a greater local reaction immunity displayed by the native, and to a less extent, by the old resident, than by the newcomer.

Ingram (A.) & Macfie (J. W. S.). **West African Ceratopogoninae. Part ii.**—*Ann. Trop. Med. & Parasit., Liverpool*, xvi, no. 3, 18th October 1922, pp. 243–282, 24 figs.

Among the species dealt with in this continued account [*R.A.E.*, B, x, 60] the following are new, and, except where otherwise stated, were collected from the Gold Coast: *Thysanognathus* (*Prionognathus*) *albopictus*, taken from a rot-hole in a mango tree; *T.* (*P.*) *melanostictus*; *Dasyhelea flavipicta*; *D. omoxantha*, from Nigeria; *Atrichopogon acanthocolpum*, from Nigeria; *A. kelainosoma*; *A. acosmetum*; *A. hesperium*; *Stilobezzia limnophila*, from Nigeria; *Eukraiohelea foyi*, from Nigeria; and *Ankistrodactylus* (*Schizodactylus*) *par*, *Palpomyia pistiae* and *Parabezzia poikiloptera*, from *Pistia stratiotes* (water lettuce).

Gordon (R. M.) & Young (C. J.). **Parasites in Dogs and Cats in Amazonas.**—*Ann. Trop. Med. & Parasit., Liverpool,* xvi, no. 3, 18th October 1922, pp. 297–300.

Of 50 stray dogs, examined post-mortem in Manáos, 11 were found to be harbouring the flea, *Ctenocephalus canis*, and two the tick, *Rhipicephalus sanguineus*. Neither parasite was found on cats.

Ingram (A.) & Macfie (J. W. S.). **A Note on the Prevalence of Ceratopogonine Midges on the Windows of the Accra Laboratory during a completed Year.**—*Ann. Trop. Med. & Parasit., Liverpool,* xvi, no. 3, 18th October 1922, pp. 301–304.

The number of Ceratopogonine midges thus collected during the year was between 3,000 and 4,000. Besides those already recorded from windows [*R.A.E.*, B, ix, 26], they included *Culicoides similis*, C., I. & M., *Thysanognathus marmoratus*, C., I. & M., *Centrorhynchus* (*Lasiohelea*) *inconspicuosus*, I. & M., ms., *Forcipomyia castanea*, Wlk., *F. incomptifeminibus*, Aust., *F. ingrami*, Cart., which, with *Culicoides schultzei*, End., is the most abundant throughout the year, *F. inornatipennis*, Aust., *F. biannulata*, I. & M., ms., and *F. squamipennis*, I. & M., ms. Species of which only one or two individuals were taken include *T. maculipennis*, C., I. & M., *T. maculithorax*, C., I. & M., *T. pseudomaculipennis*, C., I. & M., *Dasyhelea flavipicta*, I. & M., *Atrichopogon acosmetum*, I. & M., *A. africanum*, I. & M., *A. chrysospherotum*, I. & M., *A. elektrophaeum*, I. & M., *A. kelainosoma*, I. & M., *A. perfuscum*, I. & M., *A. xanthoaspidum*, C., I. & M., and *F. hirsuta*, I. & M., ms.

The commonest mosquitos captured during these collections were *Aëdes argenteus*, Poir. (*Stegomyia fasciata*, F.), *Culex fatigans*, Wied., *C. decens*, Theo., and *Aëdes* (*Ochlerotatus*) *irritans*, Theo.

Gordon (R. M.) & Evans (A. M.). **Mosquitoes collected in the Manáos Region of the Amazon.**—*Ann. Trop. Med. & Parasit., Liverpool,* xvi, no. 3, 18th October 1922, pp. 315–338, 1 pl., 10 figs.

The majority of the mosquitos dealt with were caught in the forests, about 15 miles from Manáos, on the Rio Negro. No Anophelines were discovered in the forest, the only one recorded, *Anopheles* (*Cellia*) *albimanus*, being taken on the outskirts of Manáos.

New species described are: *Sabethes amazonicus*; *Wyeomyia negrensis*, from larvae in the stem of *Bananeira braba* (wild banana); *Culex originator*, from natural holes in the bark of *Carapana uba*; *Aëdes* (*Finlaya*) *oswaldi*, Lutz, var. *braziliensis*, n., from a hollow in a tree-stump; *Megarhinus horei*, in stems of *B. braba*, this being a carnivorous species the larva of which readily destroyed larvae or pupae of *Culex fatigans* (*quinquefasciatus*); and *Uranotaenia calosomata*, D. & K., var. *albitarsis*, n., breeding in an old iron receptacle.

Archibald (R. G.). ***Trypanosoma rhodesiense* in a Case of Sleeping Sickness from the Sudan.**—*Ann. Trop. Med. & Parasit., Liverpool,* xvi, no. 3, 18th October 1922, pp. 339–340.

Three cases of human trypanosomiasis are recorded from Tembura. The morphological characters of the trypanosome concerned and its pathogenicity for various animals justify the conclusion that it is *Trypanosoma rhodesiense*. The insect vector concerned remains to be discovered, but it is significant that *Glossina palpalis* (*fuscipes*) and *G. morsitans* are ubiquitous in the district.

GIVEN (D. H. C.). **The Campaign against Mosquitoes on Board H.M.S.** *Cadmus* **in April, May and June, 1912.**—*Jl. R.N. Med. Service, London,* viii, no. 4, October 1922, pp. 265–269, 1 fig.

Since the publication of a description of a mosquito net for use with hammocks [*R.A.E.*, B, x, 132], a similar type is here described which was used in H.M.S. *Cadmus* at Hankow in 1912. Other measures against mosquitos were the use of oil of citronella and joss sticks, and cleansing the ship's sampans, which were found to be the main source of the mosquitos. Not a single case of malaria was reported during a ten months' sojourn up the Yangtse. It is recommended that the allowance of gauze netting should be three yards by two, and that citronella oil should be supplied as part of the ship's stores.

OUDEMANS (A. C.). **Ueber die Metamorphose der vogelbewohnenden Acaridiae.** [On the Metamorphosis of the Acarids infesting Birds.] —*Tijdschr. Ent., The Hague,* lxv, no. 1–3, 1st October 1922, pp. 184–191.

Annotations to the information on the above subject in existing literature are given, and also the results of the author's investigations of the various stages of bird-infesting Sarcoptid mites.

TRIGO (P.). **La sarna de las ovejas.** [Sheep Mange.]—*Anales Soc. Rur. Argentina, Buenos Aires,* lvi, no. 8, 15th April 1922, pp. 238–241. [Received 21st October 1922.]

In this article the various forms of sheep mange—sarcoptic, psoroptic and symbiotic—are described, and the conditions influencing infestation are mentioned.

ROSENBUSCH (F.) & GONZALEZ (R.). **Contribución al estudio de la Tristeza.** [A Contribution to the Study of Piroplasmosis.]—*Inst. Biol., Soc. Rur. Argentina, Buenos Aires,* 1922, 45 pp.

Attention is here called to the fact that mortality in cattle from piroplasmosis and other tick-borne diseases may be due to the non-immunisation of young calves owing to lack, scarcity or non-infectiveness of ticks, so that the animals are subject to a severe infection when exposed to infected ticks in later life.

NEWMAN (L. J.). **Report of Economic Entomologist.**—*Western Australia Dept. Agric., Ann. Rept. 1921–1922, Perth,* 1922, pp. 28–30.

The flea, *Echidnophaga gallinacea,* has spread to such an extent, since its first discovery in the State as a poultry pest in 1921, that the infested areas have now been put under quarantine as regards the movement of birds, cats, dogs, or other animals likely to harbour the parasite.

Many colonies of *Nasonia brevicornis* (blow-fly parasite) have been reared and distributed during the year.

KAWAKAMI (Z.). **The Report on the Filariasis.**—*Japan Med. World, Tokyo,* ii, no. 9, 15th September 1922, pp. 251–254.

The diseases caused by *Filaria bancrofti,* the sole agent of human filariasis in Japan, are described, and those of dogs caused by *F. immitis* are referred to for comparison. The author does not consider that the theory that filariasis is transmitted by the bite of mosquitos is completely satisfactory. He is of opinion that Manson's original theory—that the filarial larvae complete their development in the mosquito, but then escape from it, or from its dead body, into water,

and penetrate into the human body when ingested with the water—though requiring verification, should be reconsidered; and he gives evidence to support this.

Rodenwalt (E.). **Entomological Notes.**—*Repts. Dutch-Indian Med. Civil Service, Batavia,* 1922, no. 3, pp. 185–187, 1 plate.

According to Swellengrebel it is not possible to distinguish the males of *Anopheles subpictus* var. *malayensis*, Hack. (*Myzomyia rossi*, Giles) from those of *A.* (*M.*) *vagus*, Dön. Examination of the fore-legs, however, shows differences that appear to be constant, and these are described and figured.

Some mosquito records, not yet included in Swellengrebel's lists [*cf. R.A.E.*, B, ix, 216, etc.] are given.

Sergent (Ed.) & Donatien (A.). **Transmission naturelle et expérimentale de la trypanosomiase des dromadaires par les Stomoxes.**—*Arch. Inst. Pasteur Afr. Nord., Algiers,* ii, no. 3, September 1922, pp. 291–315.

The mechanical transmission of trypanosomiasis in camels in North Africa by *Stomoxys* has been recorded in a preliminary note [*R.A.E.*, B, x, 108]. An account is given here of a severe outbreak of the disease, which is known to be transmitted in open country by Tabanids, the larvae of which abound in the damp sand at the bottom of valleys, and in more inhabited localities by *Stomoxys*, the larvae of which are found in the straw manure in stables.

Sergent (Et. & Ed.). **Etude expérimentale du paludisme des oiseaux** (*Plasmodium relictum*).—*Arch. Inst. Pasteur Afr. Nord., Algiers,* ii, no. 3, September 1922, pp. 320–329.

In one series of experiments on the action of quinine, a strong dose injected into canaries on the same day that they were bitten by infected specimens of *Culex pipiens* had no influence on the resultant infection.

Vialatte (C.). **Essai de coordination de quelques données relatives à la biologie des parasites du paludisme.**—*Arch. Inst. Pasteur Afr. Nord., Algiers,* ii, no. 3, September 1922, pp. 341–348.

A survey of the extensive literature on the classification of the species of *Plasmodium* found in man gives the following positive data: The multiplicity of the morphological types of *Plasmodium*; the seasonal alternation of these; the fact that in cultures *in vitro* haematozoa may be obtained of forms different from those placed in them; the failure of the species of *Plasmodium* found in man to infect animals; and the disappearance of the infecting power of Anophelines during hibernation. If an attempt is made to coordinate these facts, it at once becomes apparent that the purely morphological differences between the various types of *Plasmodium* are not sufficiently marked or fixed to justify a division into distinct species. There is a correlation between the appearance of a certain morphological type (*P. praecox*) and the period of the year in which Anopheline activity has reached its maximum. These facts do not contradict the hypothesis that the large amoeboid forms represent a more perfect adaptation of the *Plasmodium* to endoglobular parasitism. To confirm this it would be necessary to find and follow in the blood the transitional parasitic forms, and to reproduce experimentally the alternation of morphological forms by passing the *Plasmodium* from one man to another with an Anopheline as an intermediary.

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